HITACHI

SERVICE MANUAL

SM0418

DV-RX7000E
DV-RX7000E(UK)

DV-RX7000E

DV-RX7000E(UK)

DO NOT RESELL OR DIVERT IMPROPERLY.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

DVD VIDEO RECORDER

September 2004 Digital Media Division,Tokai

Table of contents

1 Safety Precaution for Repair

1-1 Cautions

CAUTION

Lithium battery; danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

When replacing the lithium battery it is important to use the same type and connect it correctly.

WARNING:

- Lithium batteries contain dangerous chemicals.
- Handle and dispose of with great care.
- Do not throw in a fire.
- Do not short circuit it.
- For disposal place in a plastic bag and put in waste bin.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual. Electrical components having such features are identified by marking with a ⚠ on the schematics and the parts list in this Service Manual. The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies for, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

CAUTION (COLOR LCD)

LCD display; the liquid crystal display (LCD) panel is mode by highly precise technology.

More than 99.99% of its picture elements (pixels) are effective, but some (less than 0.01%) may appear as colored bright dots. This mode not indicate a fault as the LCD panel stretches the limits of current technology.

CLASS 1
LASER PRODUCT

CAUTION

This product contains a laser diode of higher class than 1. To ensure continued safety, do not remove any covers or attempt to gain access to the inside of the product. Refer all servicing to qualified personnel.

CAUTION CLASS 2M LASER RADIATION WHEN OPEN. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS.

CAUTION

There is a high-voltage section inside the DVD recorder. When repairing or inspecting it, take great care to prevent electric shock: Use an isolating transformer, wear gloves, etc.

1-2 Use of Solder for Repairs

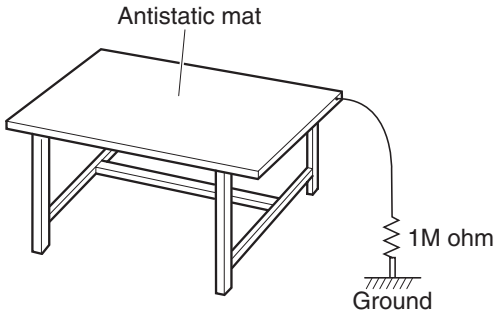
Lead-based solder is used for the printed circuit boards in this recorder.
Therefore, when servicing, use lead-based solder and set the temperature at the tip of soldering iron 30 - 40 °C lower than when using lead-free solder.

1-3 Electrostatic Protection Measures

Semiconductor components can be damaged by static electricity charged on clothes, human body, etc. Take great care when handling components to avoid electrostatic damage, and perform servicing in an environment where grounding is complete.

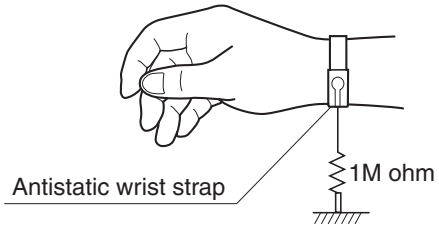
(1) Grounding work bench

Lay out an antistatic mat on work bench, and then use the ground plate to ground the work bench.



(2) Grounding human body

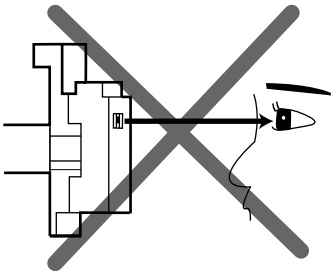
Use an antistatic wrist strap to discharge any static electricity charged on the body. Also, use a tester for wrist strap to make sure that the wrist strap is working normally. Note, however, that static electricity charged on clothes will not be discharged by wrist strap: Therefore do not allow your clothes to touch the semiconductor components.



1-4 Cautions When Handling DVD Drive

The optical pickup in DVD drive has a high precision structure: Be sure to observe the following cautions.

1) Do not subject optical pickups to any severe vibrations or impact during movement, installation or disassembly.
2) When performing repair work, do not perform disassembly any further than that described in this manual.
3) Never turn the semi-variable resistors for adjustment in optical pickup or DVD drive.
4) NEVER look into the objective lens in optical pickup or directly view the laser light: You could lose your eyesight.



Do not directly look at laser light from pickup.

1-5 Notes When Using Service Manual

(1) Value units used in parts list

Certain symbols are indicated as shown below for value units of resistors, capacitors and coils in parts list. When you read them, note the following regular indications:

Parts	Indication in list	Regular indication
Resistor	KOHM	kΩ
Capacitor	UF	μF
	PF	pF
Coil	UH	μH
	MH	mH

(2) Values in schematic diagrams

The values, dielectric strength (power capacitance) and tolerances of the resistors (excluding variable resistors) and capacitors are indicated in the schematic diagrams using abbreviations. Certain symbols are indicated for value units: When you read them note the regular indications in tables below:

[Resistors]

Item	Indication
Value	No indication ..... Ω K ..... kΩ M ..... MΩ
Tolerance	No indication ..... ±5% (All tolerances other than ±5% are indicated in schematic diagrams)
Power capacitance	No indication ..... 1/8W (1/16 W for leadless resistors with no indication) All capacitances other than the above are indicated in schematic diagrams.

[Capacitors]

Item	Indication
Value	No indication ..... μF P ..... pF
Dielectric strength	No indication ..... 50V (All dielectric strengths other than 50 V are indicated in schematic diagrams)

[Coils]

Item	Indication
Value	μ ..... μH m ..... mH

2 General Description

2-1 Overview

Model DV-RX7000E is a multi-drive DVD recorder: It can record on 12 cm and 8 cm DVD-RAM, DVD-R and DVD-RW discs, and play all of them back.
The DV-RX7000E can handle 12 cm DVD-RAM discs of both cartridge type and non-cartridge type; it can also play back DVD-Video, Audio-CD, CD-R and CD-RW discs (*).
The DV-RX7000E conforms to both recording formats: DVD video recording format (VR mode) and DVD video format (Video mode): It performs recording and playback in VR mode when using DVD-RAM discs, in Video mode when using DVD-R discs, and in either VR or Video mode when using DVD-RW discs.
The DV-RX7000E can also play back 8 cm DVD-R discs recorded on Hitachi DVD video camera/recorders even when they have not been finalized: It also has a DV input jack with which digital dubbing is possible from digital video cameras.

*: Refer to "2-1-2 Discs usable on DV-RX7000E" for details on the usable discs.

2-1-1 Service method

Basically, components are replaced when servicing the DV-RX7000E. However, the service method is different for high-density packaging PCBs and precision components.
Refer to the following table and perform the designated, appropriate servicing. Any changes that occur in the service method will be published using service bulletin, etc.
Do not perform any servicing other than that described in this manual.

Component	Service method
Exterior component	Component replacement
DVD Multi Drive	Unit replacement
Main P.C.B	Circuit board assembly replacement
Jack P.C.B	Component replacement
SMPS P.C.B	Component replacement
Key P.C.B	Component replacement

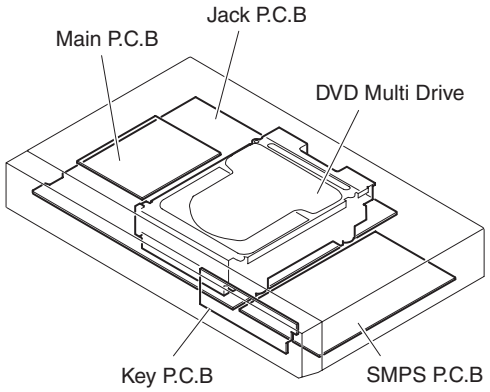


Fig. 2-1-1 Component Location

2-1-2 Discs usable on DV-RX7000E

(1) Recordable and playable discs

12 cm (5") 4.7 GB DVD-RAM discs
12 cm (5") 9.4 GB DVD-RAM discs
8 cm (3") 2.8 GB DVD-RAM discs
12 cm (5") 4.7 GB DVD-RW discs [Ver.1.1/Ver.1.1 with CPRM](*1)
12 cm (5") 4.7 GB DVD-R discs (*2)
8 cm (3") 1.4 GB DVD-R discs [for General Ver. 2.0] (*2)
12 cm (5") 4.7 GB DVD-R discs [for General Ver.2.0/4X-SPEED DVD-R Revision 1.0] (*2)

*1: No recording can be done on a finalized DVD-RW disc.
To record on a finalized DVD-RW disc, unfinalize or format it. Note that formatting a disc will delete all the recorded contents.

*2: No recording can be made on a finalized DVD-R disc.

(2) Playable only discs

DVD-Video discs
CD-Audio discs [CD-DA formatted discs]
CD-R/CD-RW discs [CD-DA, MP3, JPEG formatted discs]

2-1-3 Disc Specifications

DVD-Video

- A digital versatile disc (DVD) can contain up to 135-minutes of images, 8-language audio and 32 subtitle languages. It is equipped with MPEG-2 picture compression and Dolby digital surrounding, allowing you to enjoy vivid and clear theater quality images in the comfort of your own home.
- When switching from the first layer to the second layer of a dual-layered DVD Video disc, there may be momentary distortion in the image and sound.
  This is not a malfunction of the unit.
- Once a DVD-R/RW recorded in Video Mode is finalized, it becomes DVD-Video.

Audio CD

- An audio disc on which 44.1 kHz PCM Audio is recorded.
- Plays CD-DA format audio CD-R and CD-RW discs. The unit may not be able to play some CD-R or CD-RW discs due to the condition of the recording.

CD-R/RW

MP3 CD-R/RW

- Only CD-R discs with MP3 files recorded with ISO9660 or JOLIET format can be played back.
- Only MP3 files with the ".mp3", ".MP3" extension can be used.
- For MP3 files recorded with a VBR (Variable Bit Rates), from 32 kbps to 320 kbps, the sound may cut in out.
- Playable bitrate range is from 56 kbps to 320 kbps.
- The unit can handle a maximum of 1000 files and folders.

JPEG CD-R/RW

- Only JPEG files with the ".jpg", ".JPG" extension can be used.
- The unit can handle a maximum of 1000 files and folders.
- Maximum size of progressive JPEG is 3M pixels.
- MOTION JPEG is not supported.

Using CD-R/RW

- If the CD-R/RW disc was not recorded as a closed session, you may experience a delay in the early playback time, and all recorded files may not play.
- Some CD-R/RW discs may not be playable with this unit, depending on the device which was used to burn them.
  For contents recorded on CD-R/RW media from CDs for your personal use, playability may vary depending on contents and discs.

DVD-R Disc Playback and Recording

- Once a DVD-R recorded in Video Mode is finalized, it becomes DVD-Video.
- You can record onto the available space on the disc and perform editing functions such as giving titles to discs and programs and erasing programs before finalizing.
- When programming is erased from a DVD-R, that space does not become available. Once an area on a DVD-R is recorded on, that area is no longer vailable for recording, whether the recording is erased or not.
- It takes about 30 seconds for the unit to complete recording management information after recording finishes.
- This product optimizes the DVD-R for each recording.
  Optimizing is carried out when you start recording after inserting the disc or turning on the unit.
  Recording onto the disc may become impossible if optimizing is carried out too many times.
- Playback may be impossible in some cases due to the condition of recording.
- This unit can play back DVD-R discs recorded and finalized with a Hitachi DVD recorder. It may not be able to play some DVD-R discs depending on the disc and the condition of the recording.

DVD-RW Disc Playback and Recording

- Recording and playback can be performed on a DVD-RW discs in both the Video and VR Modes.
- Once a DVD-RW recorded in VR Mode or Video Mode is finalized, you cannot perform additional recording.
- Once a DVD-RW recorded in Video Mode is finalized, it becomes DVD-Video.
- In both modes, playback can be performed before and after finalization, but additional recording, deleting and editing cannot be performed after finalization.
- If you want to record the disc in VR Mode and then record in Video Mode, be sure to execute Format.
  Be careful when executing Format because all the recorded data may be lost.
- DVD-RW blank disc is initialized to VR Mode when first initialized.

DVD-RW (VR Mode)

- This is a format that is used for recording data on a DVD-RAM or DVD-RW disc. You can repeat recording, editing, deleting, partial deletion, creation of playlist, and etc.
- A disc that is recorded in this mode may not be played by an existing DVD player.

DVD-RW (Video Mode)

- This is a format that is used for recording data on a DVD-RW or DVD-R disc. The disc can be played by an existing DVD player once it has been finalized.
- If a disc that has been recorded in Video Mode by a different maker's recorder but has not been finalized, it cannot be played or additionally be recorded by this recorder.

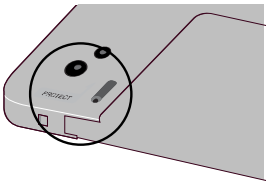
DVD-RAM Disc Playback and Recording

- DVD-RAM discs come with or without a cartridge. For this product, we recommend DVD-RAM discs that come with cartridges.
- Some cartridges are able to eject the disc inside.
  Even if you are able to eject the disc, always use the disc with the cartridge to ensure correct operation.
- DVD-RAM discs have a Write Protect tab in order to avoid accidental erasure of recorded data. With the Write Protect tab set to PROTECT, you can play the disc, but recording or erasing will not work.
  Set the Write Protect tab to UNPROTECT to format the disc or erase data.
- Ensure that the recording mode is set to VR Mode. Otherwise, this product will not be able to play the recording.
- You cannot play a DVD-RAM in most DVD players due to compatibility issues.
- Only DVD-RAM standard Version 2.0 discs can be played in this unit.
- DVD-RAM recorded on this unit may not work with other DVD players. To determine compatibility with these DVD-RAM discs, refer to the user's manual for the player.
- This unit is compatible with both non-cartridge and cartridge DVD-RAM, but the write-protect tabs on cartridge-type discs give better protection to your recordings.

COPY PROTECTION

- Many DVD discs are encoded with copy protection. Because of this, you should only connect your DVD recorder directly to your TV, not to a VCR.
  Connecting to a VCR results in a distorted picture from copy-protected DVD discs.
- This product incorporates copyright protection technology that is protected by methods claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners. Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

This DVD Recorder can allow you to protect the contents of your discs, as described below.



- Cartridge-protected: With the write-protect tab located in the protect position, the contents of the disc cannot be recorded, edited, or erased.
- Program-protected: See “Locking a Title”.
- Disc-protected: See “Disc Protection”.

* DVD-RAM/DVD-RW/DVD-R discs that are incompatible with VR/Video format cannot be played with this product.
* For more information on recording a DVD, consult your DVD-RAM/DVD-RW/DVD-R manufacturer.
* If poor quality DVD-RAM/DVD-RW/DVD-R discs are used, your recordings may fail.

Do not use the following discs!

- LD, CD-G, CD-I, Video-CD, CD-ROM, DVD-ROM, DVD+R and DVD+RW discs should not be used in this product.

[Note]

Disc types that can be played : CD/CD-R/CD-RW/MP3/JPEG/DVD-Video/DVD-RAM/DVD-RW/ DVD-R. For a DVD-R/DVD-RW disc, which has been recorded in Video Mode on another component, it can play only when finalized.

- Some commercial discs and DVD discs purchased outside your region may not be playable with this product.
  When these discs are played, either “No disc.” or “Please check the regional code.” will be displayed.
- If your DVD-RW disc is an illegal copy or is not in DVD video format, it may also not be playable.

* We recommend using Hitachi Maxell discs as they have been confirmed to be compatible with this unit. Other discs may not perform correctly.

2-2 Features

The DV-RX7000E allows you to record and play high quality digital images on DVD-RAM/DVD-RW/ DVD-R discs. You can record and edit digital images on DVD-RAM/DVD-RW/DVD-R discs as if they were VCR tapes.

(1) High quality digital audio and video recording and playback

Record up to about 12-hour images with a double sided 9.4 GB DVD-RAM disc, and up to about 6-hour images with a 4.7 GB DVD-RAM/DVD-RW/DVD-R disc, depending on the recording mode.

(2) Selectable Recording Mode

You can set your recorder to one of four different recording speeds, each varying in recording quality and length. EP mode yields the most recording time, LP & SP modes provide less recording time with higher quality recording, and XP mode gives you the highest quality recording.

(3) Automated Quality Adjustment for Timer Recording

If FR (Flexible Recording) mode is selected, the video quality is adjusted automatically so that all images for the scheduled time can be recorded onto the free disc space.

(4) Time Slip and Picture In Picture (PIP)

Use the Time Slip function to review the recorded images while a recording is underway.
Use the PIP function to view both the playback and recording screens simultaneously.

(5) Creating DVD video title using DVD-RW/DVD-R disc

With DV-RX7000E, create your own DVD video title on 4.7 GB DVD-RW/DVD-R discs.

(6) Copying data from a digital camera recorder using a DV input jack

Record digital camera recorder images onto DVD-RAM or DVD-RW, DVD-R discs using the DV input jack (IEEE 1394-4pin).

(7) A variety of functions with easy-to-use user interface

The integrated menu system and the messaging function allow you to perform desired operations both easily and conveniently. With a DVD-RAM or DVD-RW disc, you can edit recorded images, create a playlist, and edit images in a specific sequence according to your requirements.

2-3 Specifications

Item			Specifications
General	Power Requirements		230V AC, 50 Hz
	Power Consumption		35 Watts
	Weight		8.27 lb (approx. 3.8 kg)
	Dimensions		16.9 in (W) × 11 in (D) × 2.7 in (H) (approx. 430 mm (W) × 279 mm (D) × 69 mm (H))
	Operating Temp.		+41°F to +104°F (+5°C to +40°C)
	Other Conditions		Keep level when operating. Less than 75% operating humidity
Input	Video (AV3, AV4)		Composite Video: 1.0 Vp-p at 75 ohm load, sync negative
			S-Video input (Y: 1.0 Vp-p, C: 0.3Vp-p at 75 ohm load)
	Audio (AV3, AV4)		Max. Audio Input Level: 2 Vrms
	DV Input		IEEE 1394 (4p) compatible jack
	Receivable Channels		PAL I
	Scart Jack	AV1 (Scart TV)	Video: Composite, Audio: Analog
		AV2 (Scart Ext)	Video: Composite/RGB, Audio: Analog
Output	Audio		Analog output jacks 1, 2
			Optical/Coaxial digital audio output
			Full-scale analog output level: 2 Vrms
	Video		Campsite Video: Video output jack 1
			S-Video output 1 (Y: 1.0 Vp-p, C: 0.3Vp-p at 75 ohm load)
	Scart Jack	AV1 (Scart TV)	Video: Composite/RGB, Audio: Analog
		AV2 (Scart Ext)	Video: Composite, Audio: Analog
Recording	Picture Compression Format		MPEG-II
	Audio Compression Format		Dolby Digital 2 ch/256 kbps, MPEG-II
	Recording Time		XP (about 1 hour), SP (about 2 hours), LP (about 4 hours) EP (about 6 hours), FR (about 1 to 6 hours)
	Audio Frequency Response		20 Hz to 20 kHz

Audio Output

For DVD discs, audio signals recorded at 96 kHz sampling frequency are converted and output 48 kHz.

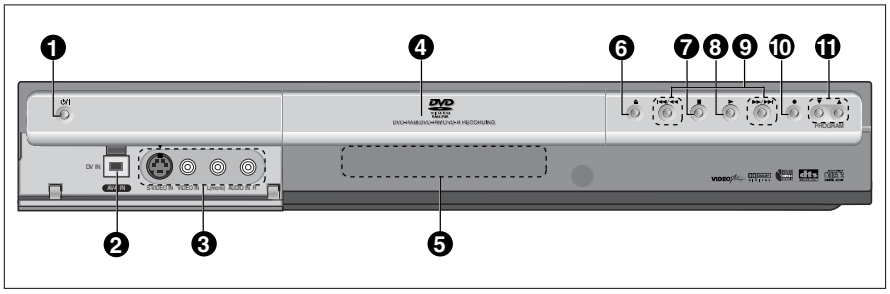
DVD	Disc Type	Audio CD (CD-DA)
Analog Audio Output	48 / 96 kHz	44.1 kHz
Digital Audio Output	48 kHz	44.1 kHz

2-4 List of Major Functions

Function		Outline
Recording	Time Slip	Plays the images recorded approx. 10 seconds before on picture-in-picture screen during recording.
	Flexible Recording (FR) Mode	Chooses the recording mode automatically during timer recording so that the data will be recorded in the blank capacity of disc.
	One Touch Recording (OTR)	Can set the recording time up to 6 hours in 30-minute units, by pressing the REC button repeatedly.
Playback	CM Skip	Skips the manually specified time (15, 30 or 60 seconds) for playback.
	Disc Menu & Title/Play List Playback	Plays back the portion selected from the recorded menu, title list or play list.
	Chapters or Tracks Search	Searches for chapters or tracks in chapter/track units.
	Slow Motion Play	Plays images with slow motion.
	Step Motion Play	Advances or backs frame by frame.
	Repeat Play	Plays desired chapter or title repeatedly.
	A-B Repeat Play	Plays a specified range repeatedly.
	Camera Angle Change	When a multi-angle DVD-Video disc is played back, images from different angles can be displayed.
	Zooming-In	Magnifies a desired portion of image up to 4 times.
	Picture in Picture (PIP)	Displays a small screen on the normal screen.
	Marker/Bookmark	Marks desired scene(s) so that playback can be performed from those scene(s).
	Audio CD Play	Can play back CDs of CD-DA format.
	MP3 Disc Play	Can play back CD-R/CD-RW discs of MP3 format.
	Picture CD Play	Can play back CD-R/CD-RW discs of JPEG format.
Other	Edit Title List	Allows user to edit title lists.
	Edit Playlist	Allows user to edit playlists.
	Edit Disc Name	Allows user to change disc name.
	Disc Protect	Protects disc to prevent accidental erasure.
	Disc Format	Initializes DVD-RW/DVD-R.
	Disc Finalize/Unfinalize	Finalizes DVD-RW/DVD-R and releases finalization of DVD-RW.
	Digital Audio Output	This recorder is equipped with two digital audio output jacks: optical and coaxial. Output of PCM, bitstream or DTS is possible.
	DTS Output	
	Dynamic Range Compression	Dynamic Range Compression / Compresses the dynamic range when Dolby Digital signal is detected so that low volume sound is easier to hear.
	NICAM	Conforms to NICAM stereo/mono/bilingual.
	TV Aspect	Can set the aspect ratio of playback image to 4:3 letter-box, 4:3 pan-scan or 16:9 wide.
	3D Noise Reduction	Removes video noise with high precision to suppress roughness at edges.
	Parental Control	Restricts the viewing/hearing of DVD-Video with audio-visual restrictions in 8 steps: The restriction rating is protected by a password with a four-digit number.

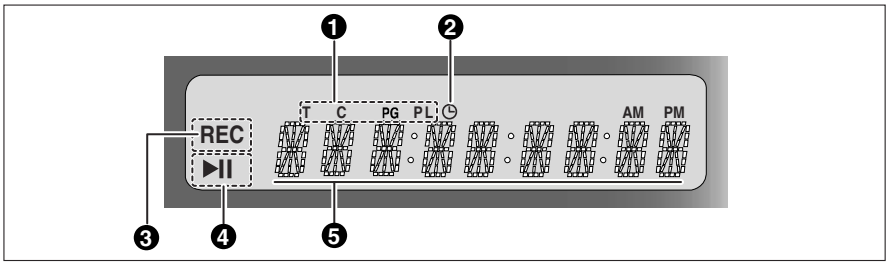
2-5 Names of Parts

Front Panel



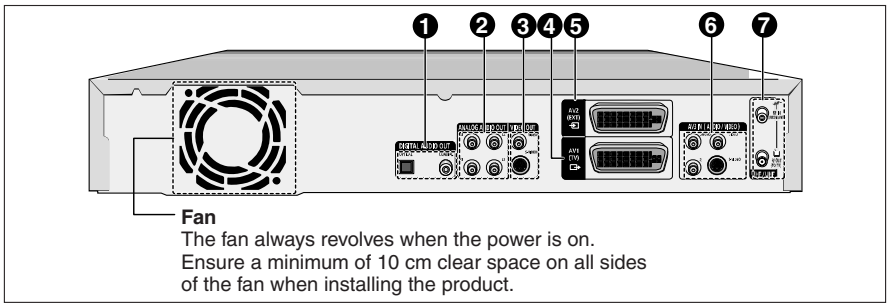
❶ **STANDBY/ON**
Turns the recorder on and off.
Press to turn the power on and off. (As to the indication of the Operate switch, "I " shows ON and " ⏻ "shows electrical power stand-by.)
❷ **DV-IN**
Connects external digital equipment with a DV jack.
❸ **AV4 IN**
Connects external equipment.
❹ **DISC TRAY**
Opens to accept a disc.
❺ DISPLAY
Displays the playing status, title/chapter/time, etc.
❻ **OPEN/CLOSE**
Opens and closes the disc tray.
❼ **STOP**
Stops disc playback.
❽ **PLAY/PAUSE**
Plays a disc or pauses playback.
❾ **SEARCH**
Goes to the next title/chapter/track, or goes back to the previous title/chapter/track.
❿ **REC**
Starts recording.
⓫ **PROGRAM**
Select TV preset channels.
Same as PROG buttons in remote control.

Front Panel Display



❶ This lights to indicate the names of the sections of the disc being played.
❷ Lights to indicate the timer recording mode.
❸ Lights in the record mode.
❹ Lights in the playback/pause mode.
❺ Displays the title, chapter, title list or playlist number and displays the message during playback.

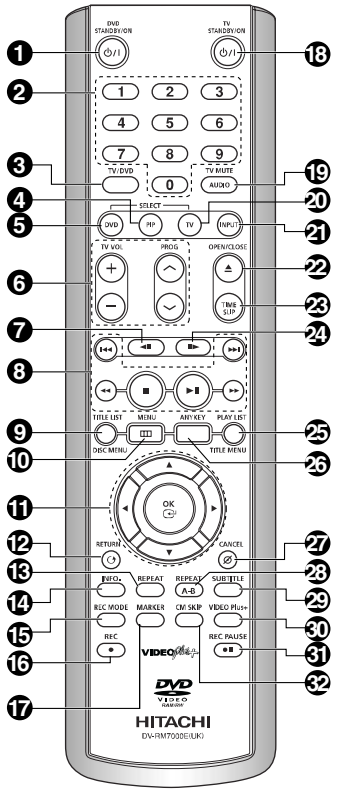
Rear Panel



Fan
The fan always revolves when the power is on.
Ensure a minimum of 10 cm clear space on all sides of the fan when installing the product.

❶ **DIGITAL AUDIO OUT**
Connects to an amplifier having a digital input jack.
❷ **ANALOG AUDIO OUT**
Connects to the audio input of external equipment using audio cables.
❸ **VIDEO OUT**
Connects the input of external equipment using a Video or S-Video cable.
❹ **AV1 (TV) OUTPUT SCART**
❺ **AV2 (EXT) INPUT SCART**
❻ **AV3 IN (AUDIO/VIDEO)**
Connects the output of external equipment using an audio/video or S-Video cable.
❼ **VHF/UHF**
Connects aerial cables.

Tour of the Remote Control



❶ **DVD STANDBY/ON Button**
Press to turn the power on and off. (As to the indication of the Operate switch, " I " shows ON and " ⏻ " shows electrical power stand-by.)

❷ **Number Buttons**

❸ **TV/DVD Button**

❹ **PIP Button**
Use to watch a sub programme on the PIP screen while watching the main programme on the main screen.

❺ **DVD Button**
Press this when you use a DVD.

❻ **TV Control Buttons**
- TV VOL Button
  TV volume adjustment
- PROG Button
  Allows you to programme a specific order. Same as PR buttons in Front panel.

❼ **REVERSE STEP Button**
Each press of this button will play one-frame reverse.

❽ **Playback-related buttons**
Search, Skip, Stop, Play/Pause

❾ **TITLE LIST/DISC MENU Button**
Use this to enter the View Recording list/Disc menu.

❿ **MENU Button**
Brings up the DVD recorder's setup menu.

⓫ **OK/DIRECTION Buttons**
(UP/DOWN or LEFT/RIGHT Buttons)
This button functions as a toggle switch.

⓬ **RETURN Button**
Returns to a previous menu.

⓭ **REPEAT Button**
Allows you to repeat a title, chapter, track or disc.

⓮ **INFO. Button**
This will display current settings or disc status.

⓯ **REC MODE Button**
This will display the recording status.

⓰ **REC Button**
Use to make a recording on DVD-RAM/RW/R discs.

⓱ **MARKER Button**
Use this to bookmark a position while playing a disc.

⓲ **TV STANDBY/ON Button**

⓳ **AUDIO/TV MUTE Button**
Use this to access various audio functions on a disc. (DVD mode)
This operates as Sound Mute. (TV mode)

⓴ **TV Button**
Press this to operate TV.

㉑ **INPUT Button**
Select line input signal in external input mode. (Tuner or Line input)

㉒ **OPEN/CLOSE Button**
To open and close the disc tray.

㉓ **TIME SLIP Button**
The Time Slip function allows you to view a recorded programme through the PIP window at least 10 seconds after recording starts. Playback and recording can be done at the same time.

㉔ **FORWARD STEP Button**
Each press of this button will play one-frame forward.

㉕ **PLAY LIST/TITLE MENU Button**
Use this to return to the Title menu, or to view the recorded files list.

㉖ **ANYKEY Button**
Use this to view the status of the disc that is being played.

㉗ **CANCEL Button**

㉘ **REPEAT (A-B) Button**
Press to repeat between A-B disc.

㉙ **SUBTITLE Button**
Press this to switch the DVD's subtitle language.

㉚ **VIDEO Plus+ Button**
Press to make a timer recoding of a programme by entering the programme's VIDEO Plus+ number.

㉛ **REC PAUSE Button**
Use this to pause during recording.

㉜ **CM SKIP Button**
When a programme recorded on a DVD-RAM, a DVD-RW, a DVD-R or DVD-Video is played, the unit can be set to automatically skip a portion of the programme.

2-6 List of Abbreviations and Terms for DVD Recorder

Index	Abbreviation/Term	Explanation
A	AC3	See Dolby AC3.
B	Black Level	Function to correct the gradations on dark portions to make dark scenes easier-to-see.
C	CPRM	Content Protection for Recordable Media: Copyright protection function that is suitable for online distribution of music.
	CD-R	One type of DVD standard disc, to which writing once is possible (recordable type)
	CD-RW	One type of CD standard disc, to which writing up to 1000 times is possible
	Component video output terminals	Used for outputs of HDTV video signal format. Since signals for brightness and colors are independently handled for components signals (Y: luminance signal; PR/PB: chrominance signals), degrading of image will be reduced.
D	Decoder	A device that decodes the data coded and recorded on DVD Video and restores it to video and audio signals. This processing is referred to as decoding.
	Dynamic Range	A difference between maximum and minimum levels of audio recorded on disc: Measured in decibel (dB) units. If the dynamic range is compressed (audio DRC), the minimum signal level will increase and the maximum signal level will decrease: This will reduce the higher audio signal - such as burst sound - so that the low-level audio signal - such as human voice - can be heard more clearly.
	Dolby AC3	Audio coding format developed by Dolby Laboratories in U.S, also simply referred as AC3 format: Supports 5-channel full-range sound and one channel for sub-woofer sound playback.
	DRC	Dynamic Range Control: Adjusting the audio range of maximum and minimum levels (dynamic range) will improve audio signal when, for example, dialog is hard to hear or user is watching movies late at night.
	DTS	Digital Theater System: Sound system as for movie theaters developed by US Digital Theater Systems, Inc. The number of channels provided by DTS is the same for Dolby AC3.
	DVD	Digital Versatile Disc. A huge amount of digital data for video (movie) and audio can be recorded on this disc, whose size is the same as CD.
	DVD-Audio	One type of DVD standard disc, on which high-quality audio can be recorded
	DVD-R	One type of DVD standard disc, to which writing once is possible (recordable type)
	DVD-RAM	One type of DVD standard disc, to which writing up to 100,000 times is possible
	DVD-RW	One type of DVD standard disc, to which writing up to 1000 times is possible
	DVD-Video	One type of DVD standard disc, on which high-quality video and audio can be recorded
	DVD Video Format	Video recording/playback standard that applies to DVD-Video, DVD-R and DVD-RW
	DVD Video Recording Format	Video recording/playback standard that applies to DVD-RAM and DVD-RW: This allows versatile editing functions, differing from the DVD Video Format.
I	I/P/B	DVD recorders normally use data that is common between images, and individually record different data for each image. I-picture: Images recorded independently for the reference of commonly used data. P-picture: Images created from past I-picture or P-picture B-picture: Images created from both I and P pictures, which interact between both types Since I-picture delivers the highest image quality, selecting I-picture is recommended when adjusting image quality.

Index	Abbreviation/Term	Explanation
J	JPEG	Joint Photographic Expert Group: International standard format for compressing still images.
M	MPEG	Moving Picture Experts Group: Standard related to compression of digital video and audio. MPEG2 is a higher standard of MPEG and is applied to video (movie) requiring higher quality.
	MPEG Audio Layer 2	One of three audio compression standards (layers 1-3) defined by MPEG
	MP3	MPEG1 Audio Layer-3: Audio data digital compression technology.
O	Optical digital audio output	Audio is usually converted to an electrical signal and transmitted from DVD to a device such as amp: When audio is converted to a digital signal, this optical digital audio output can be transmitted on optical fiber.
P	Pan & Scan/ Letterbox	Most DVD videos are produced assuming that they will be displayed on wide TV screen (aspect ratio of 16:9): If they are displayed on TV screens with 4:3 aspect ratio, 16:9 images will not quite fit on 4:3 screens. There are two ways of displaying 16:9 images on 4:3 TV: · Pan & Scan: Cuts out the left and right ends of images and displays them on whole screen. · Letterbox: Reproduces 16:9 images on 4:3 screens with black bands across the top and bottom of screen.
	Playback Control (PBC)	One format to play Video CD: User can select desired screens and data while watching the displayed menu screen.
	Progressive playback function	This function converts interlaced images to non-interlaced images and displays them. It can play back 24-frame/second images included in DVD movie software, etc.
S	S-Video Output	The video signal is separated into chrominance (C) and luminance (L) signals and transmitted to TV: This delivers clearer images.
	Sampling Frequency	Sampling slices audio waves (analog signal) at a specified time interval, and digitizes the levels of the sliced waves. The slicing number per second is referred to as the sampling frequency: The higher the number, the closer the sound to the original.
	SDMI	Secure Digital Music Initiative: This conference was established by hardware makers, the Recording Industry Association of America (RIAA) and music industry companies, to protect copyrights of musical compositions.
T	Tracking	To make adjustment for clearer playback image, by reducing noise that appears on screen during videotape playback.
V	Virtual surround	This technology localizes sound at any position using only two front speakers, by subjecting the L and R signals to matrix operation. It uses the four transfer functions from L/R speakers located at specified positions to both ears of listener located in a specified position, taking into account the shape of head and the effect of earlobes, and the two transfer functions from any position to both ears.
W	WMA	Windows Media Audio: Codec that was developed by Microsoft Corporation in USA.

3 Details of Servicing and Troubleshooting

3-1 Details of Servicing

3-1-1 Removing Disc from Faulty Recorder

If disc cannot be removed due to fault, disassemble the recorder and remove the disc by the following procedure:

1) Remove the top cover.
   [See 4-2 (1) for removal procedure.]
2) Remove the front panel.
   [See 4-2 (2) for removal procedure.]
3) Use a screwdriver, etc. to move the cam slider at the right of DVD Multi drive in the direction of arrow A: The disc tray will slightly come forward.
   Pull out the disc tray in the direction of arrow B. Take great care during this work so as not to damage the disc.

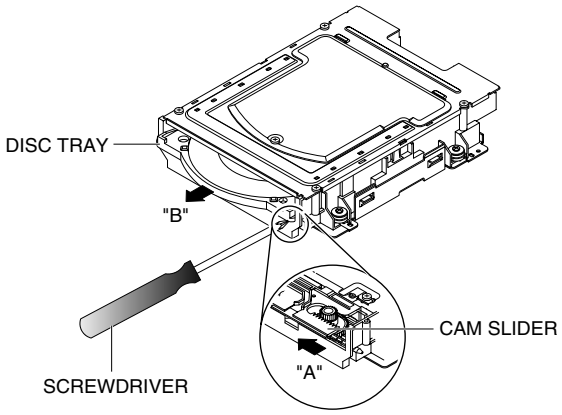


Fig. 3-1-1 Removing Disc

3-1-2 Firmware

The firmware is occasionally updated to improve performance.
Check whether a customer complaint can be solved by updating of firmware: If the complaint can be solved, update the firmware.

> Information:
> If any corrections in firmware are made at the factory, information on how to obtain the firmware data and create a disc containing upgraded firmware will be reported in technical bulletin, etc.

(1) Version check procedure

1) Turn the recorder on and open the disc tray.
2) Hold down the [INFO.] button on remote control for 3 seconds: The firmware version will appear on the screen.
3) Close the disc tray to switch off the display.

CPRM : xx
CS : xx
xx xxxxxx.xx.xxxxxxxxx
FM : xxx
CW : xxx - xxx
FE : xx.x
MACROVISION xxxx
Date : xxxx.xx.xx

Information:
Display xxxx on the above screen shows the numbers or alphabets.

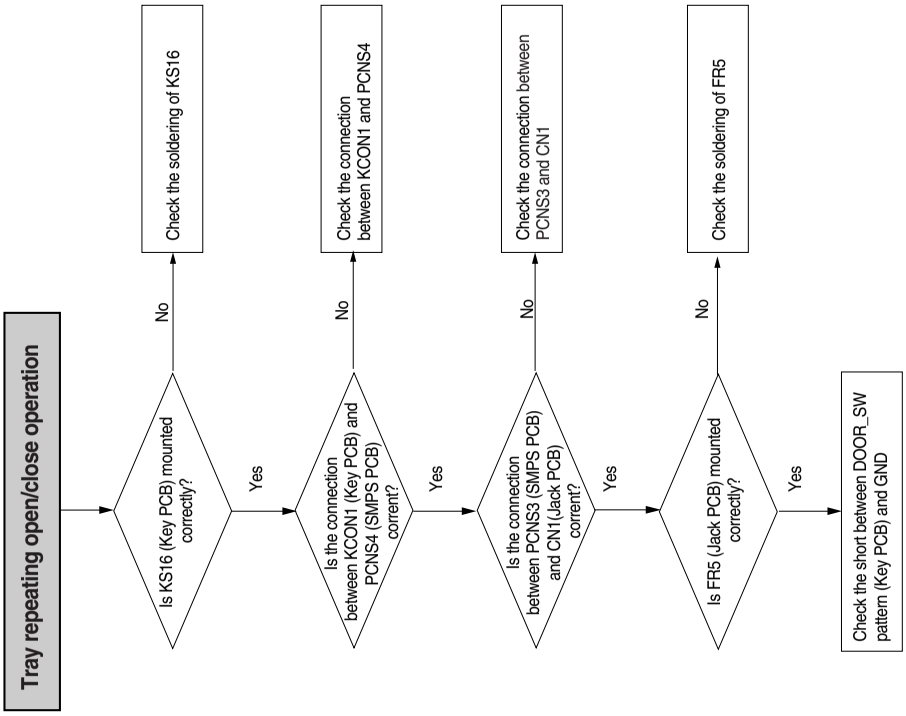
Fig. 3-1-2 Version check screen

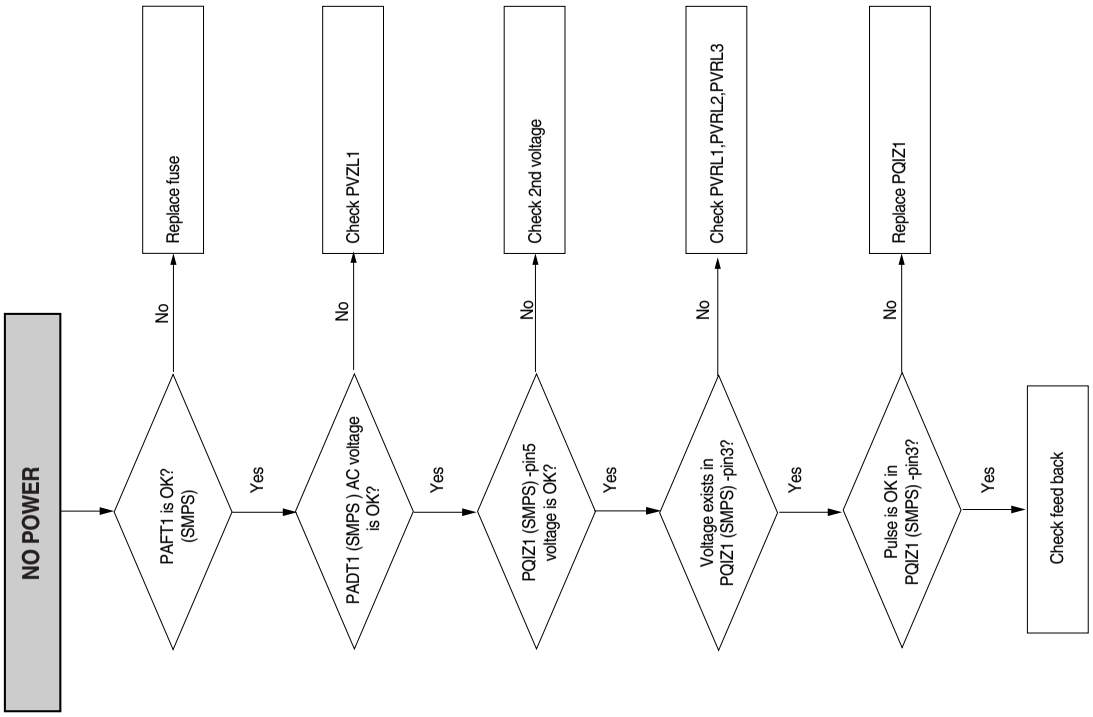
(2) Updating Firmware

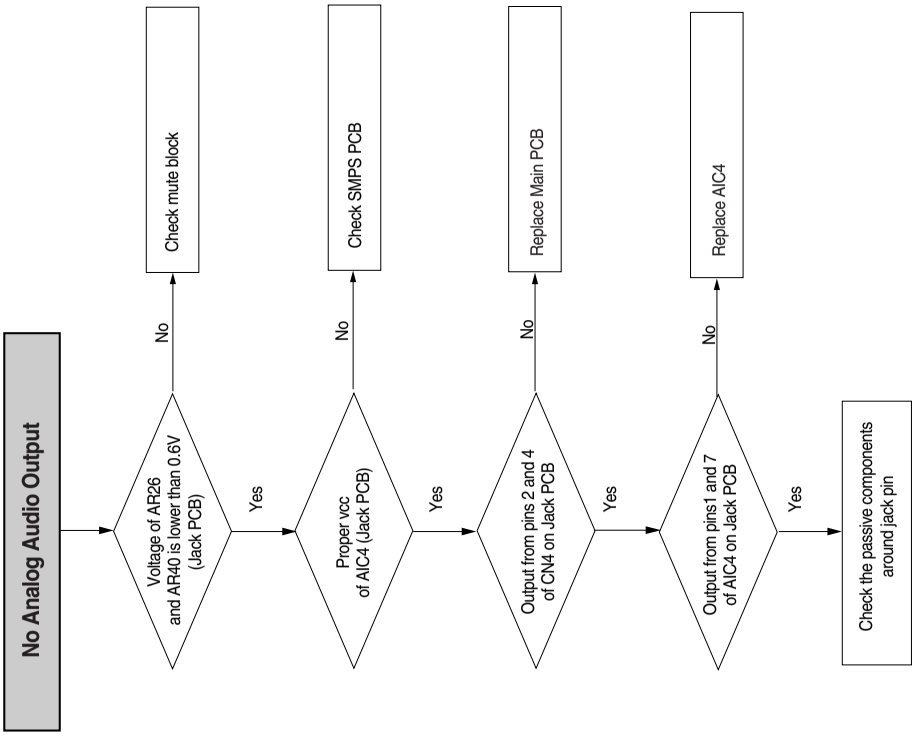
1) Write the firmware data to CD-R or CD-RW.
2) Insert the disc into the tray: Recognition of the disc will start and the screen for confirming updating will appear.
3) Choose [Yes], and then press the [OK] button on remote control.
4) When updating is complete, the tray will automatically open: Remove the disc.
5) Turn the recorder off, and then on again: The tray will automatically close.
6) The screen for setting language will appear: Use the numeric button on remote control to choose the desired language.
7) Turn the recorder off to finish the updating of firmware.

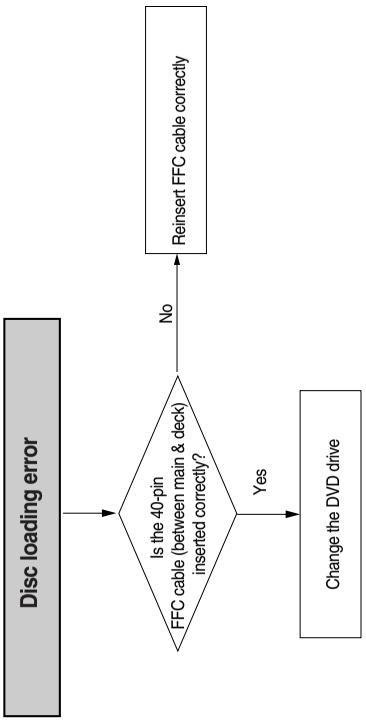
Fig. 3-1-3 Language Setting Screen

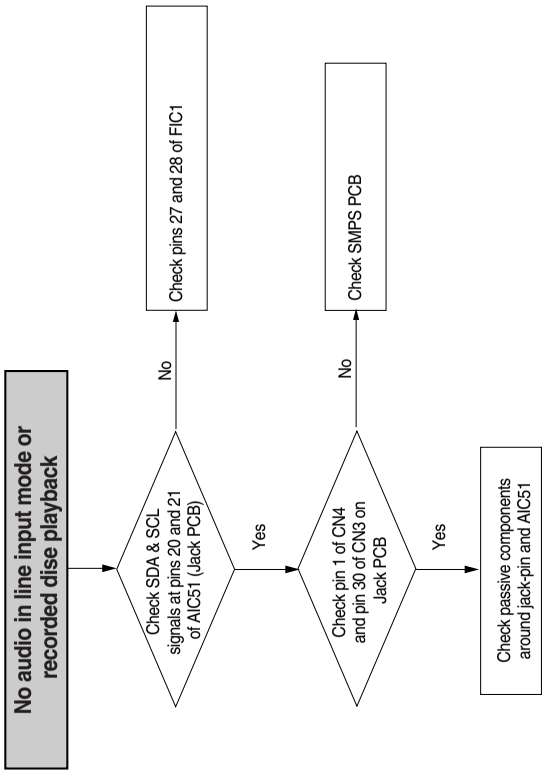
3-2 Troubleshooting

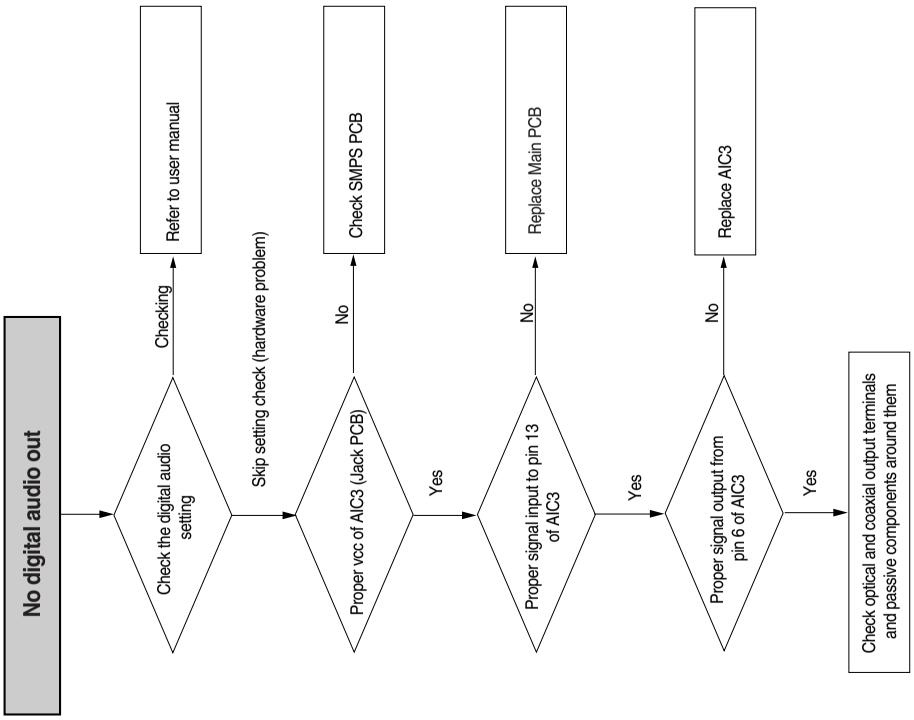


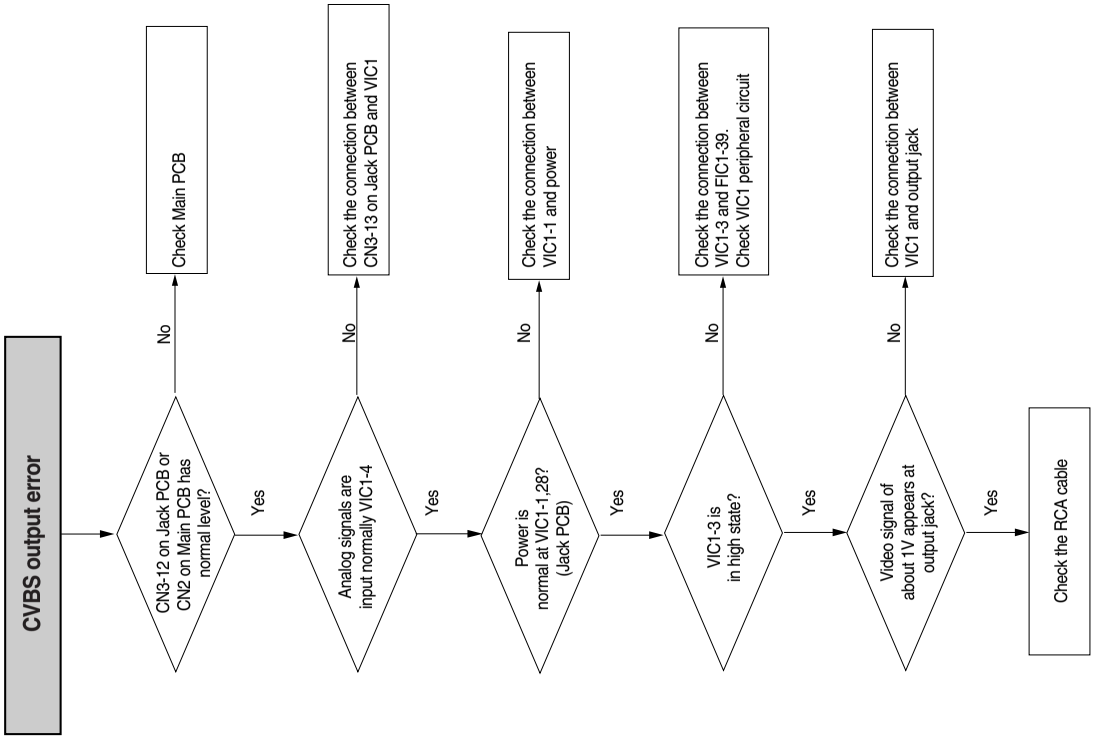


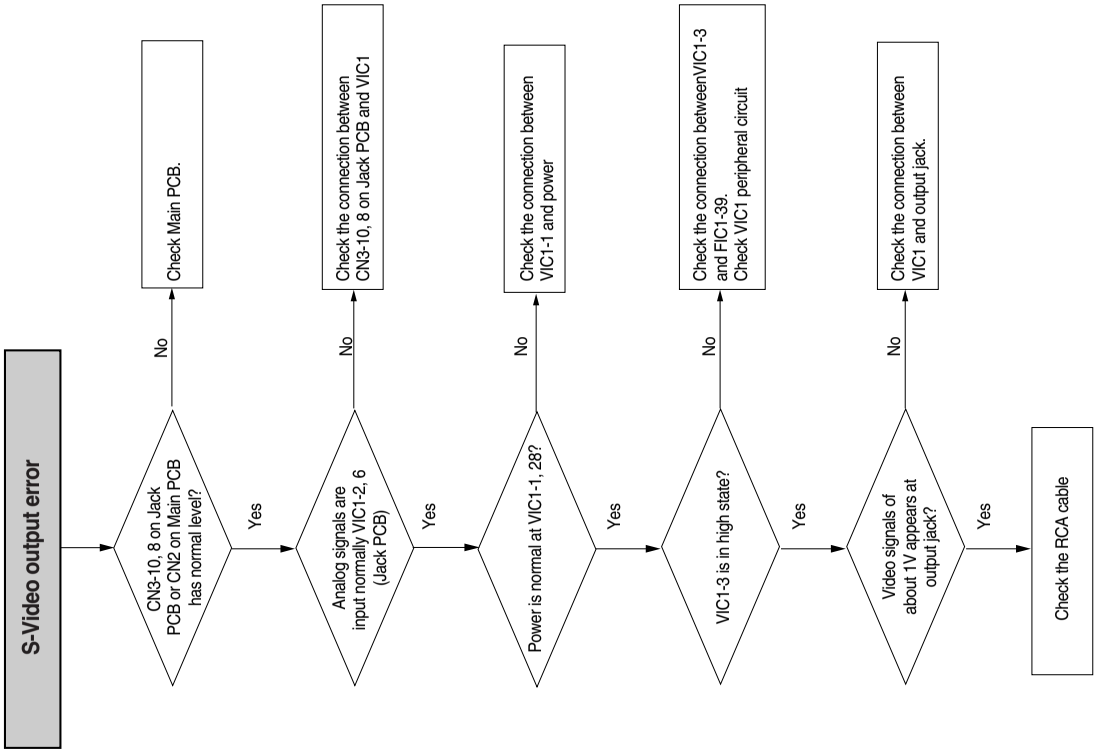

No Analog Audio Output
Voltage of AR26 and AR40 is lower than 0.6V (Jack PCB)
No
Check mute block
Yes
Proper vcc of AIC4 (Jack PCB)
No
Check SMPS PCB
Yes
Output from pins 2 and 4 of CN4 on Jack PCB
No
Replace Main PCB
Yes
Output from pins1 and 7 of AIC4 on Jack PCB
No
Replace AIC4
Yes
Check the passive components around jack pin

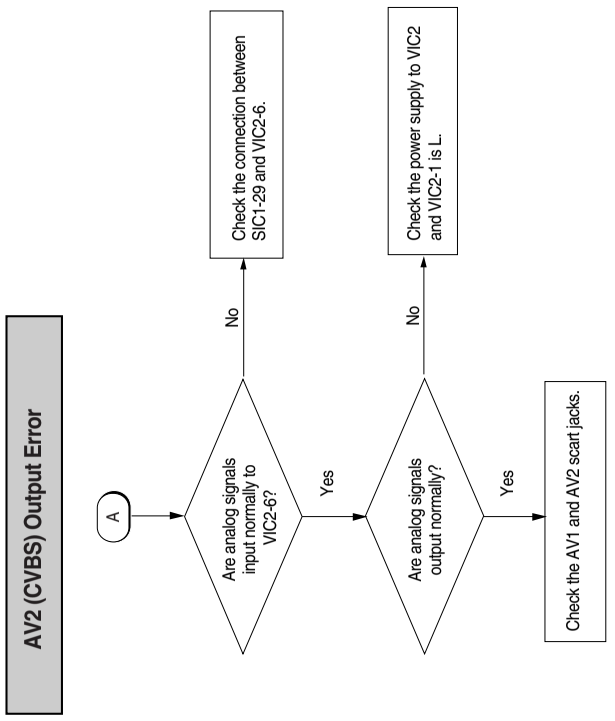

Disc loading error
Is the 40-pin FFC cable (between main & deck) inserted correctly?
No
Reinsert FFC cable correctly
Yes
Change the DVD drive

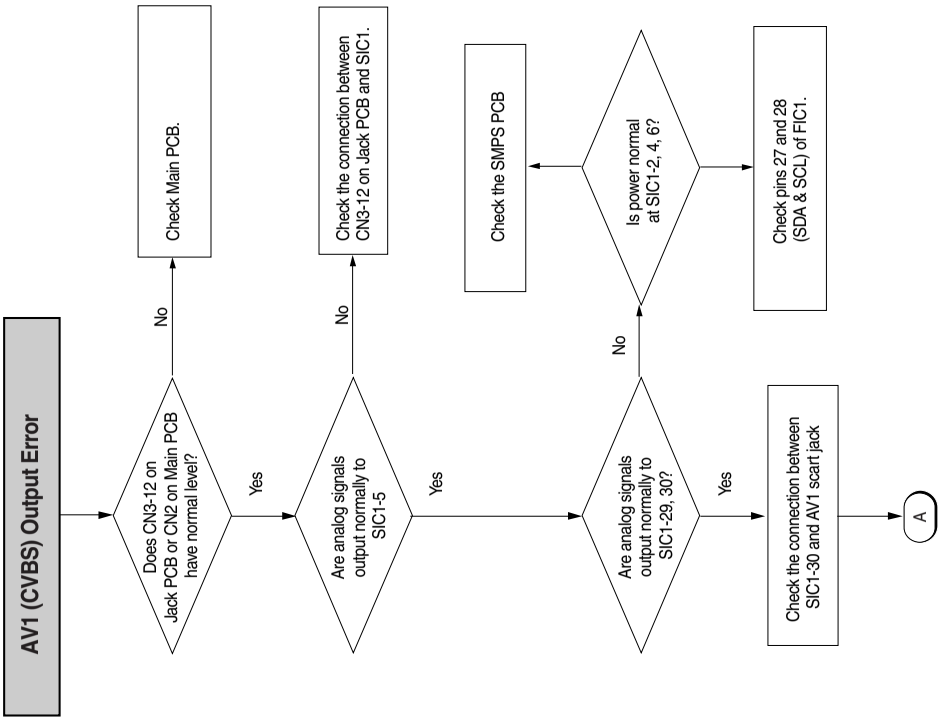

No audio in line input mode or recorded dise playback
Check SDA & SCL signals at pins 20 and 21 of AIC51 (Jack PCB)
No
Check pins 27 and 28 of FIC1
Yes
Check pin 1 of CN4 and pin 30 of CN9 on Jack PCB
No
Check SMPS PCB
Yes
Check passive components around jack-pin and AIC51

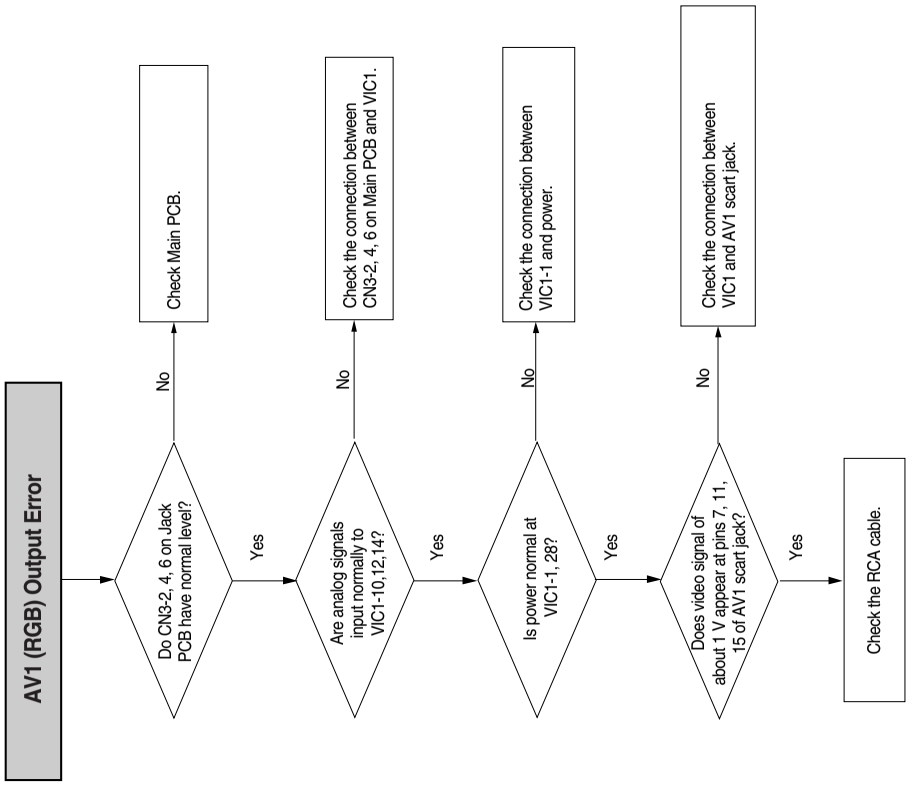

No digital audio out
Check the digital audio setting
Checking
Refer to user manual
Skip setting check (hardware problem)
Proper vcc of AIC3 (Jack PCB)
No
Check SMPS PCB
Yes
Proper signal input to pin 13 of AIC3
No
Replace Main PCB
Yes
Proper signal output from pin 6 of AIC3
No
Replace AIC3
Yes
Check optical and coaxial output terminals and passive components around them

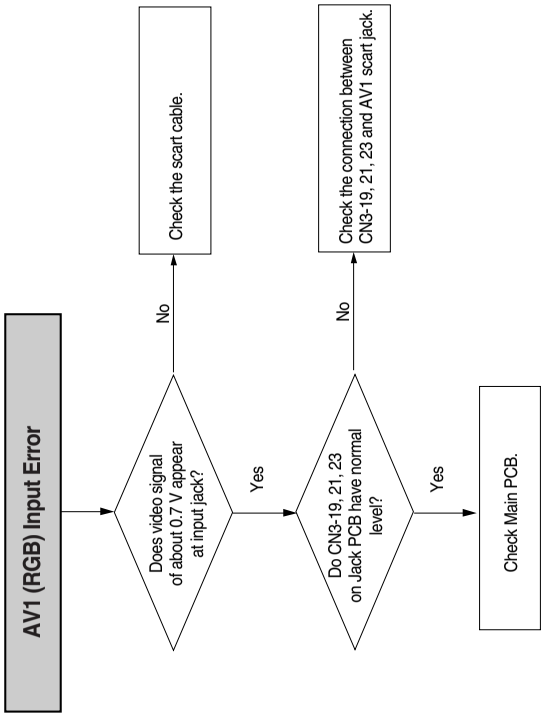

CVBS output error
CN3-12 on Jack PCB or CN2 on Main PCB has normal level?
No
Check Main PCB
Yes
Analog signals are input normally VIC1-4
No
Check the connection between CN3-13 on Jack PCB and VIC1
Yes
Power is normal at VIC1-1,28? (Jack PCB)
No
Check the connection between VIC1-1 and power
Yes
VIC1-3 is in high state?
No
Check the connection between VIC1-3 and FIC1-39. Check VIC1 peripheral circuit
Yes
Video signal of about 1V appears at output jack?
No
Check the connection between VIC1 and output jack
Yes
Check the RCA cable

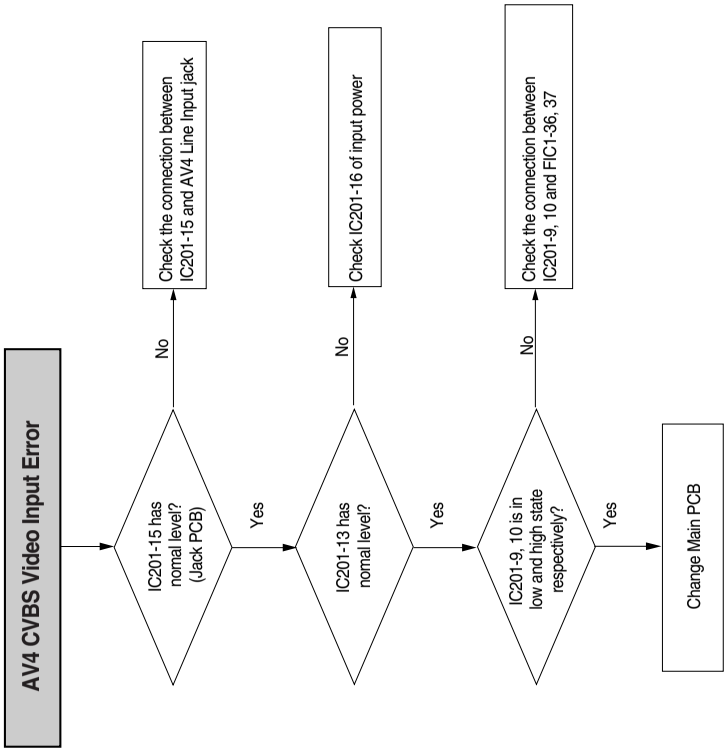

S-Video output error
CN3-10, 8 on Jack PCB or CN2 on Main PCB has normal level?
No
Check Main PCB.
Yes
Analog signals are input normally VIC1-2, 6 (Jack PCB)
No
Check the connection between CN3-10, 8 on Jack PCB and VIC1
Yes
Power is normal at VIC1-1, 28?
No
Check the connection between VIC1-1 and power
Yes
VIC1-3 is in high state?
No
Check the connection betweenVIC1-3 and FIC1-39. Check VIC1 peripheral circuit
Yes
Video signals of about 1V appears at output jack?
No
Check the connection between VIC1 and output jack.
Yes
Check the RCA cable

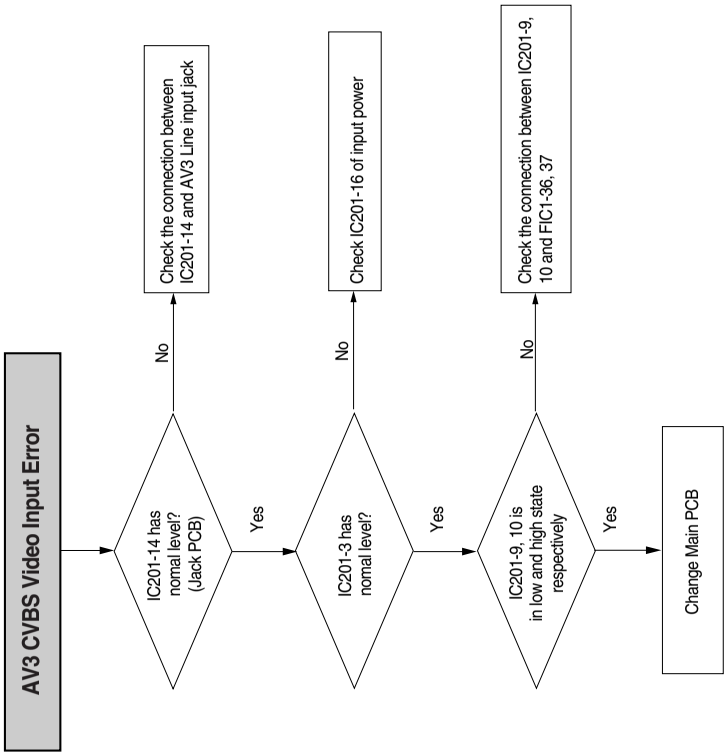

AV2 (CVBS) Output Error
A
Are analog signals input normally to VIC2-6?
No
Check the connection between SIC1-29 and VIC2-6.
Yes
Are analog signals output normally?
No
Check the power supply to VIC2 and VIC2-1 is L.
Yes
Check the AV1 and AV2 scart jacks.


AV1 (CVBS) Output Error
Does CN3-12 on Jack PCB or CN2 on Main PCB have normal level?
No
Check Main PCB.
Yes
Are analog signals output normally to SIC1-5
No
Check the connection between CN3-12 on Jack PCB and SIC1.
Yes
Are analog signals output normally to SIC1-29, 30?
No
Is power normal at SIC1-2, 4, 6?
Check the SMPS PCB
Check pins 27 and 28 (SDA & SCL) of FIC1.
Yes
Check the connection between SIC1-30 and AV1 scart jack
A


AV1 (RGB) Output Error
Do CN3-2, 4, 6 on Jack PCB have normal level?
No
Check Main PCB.
Yes
Are analog signals input normally to VIC1-10,12,14?
No
Check the connection between CN3-2, 4, 6 on Main PCB and VIC1.
Yes
Is power normal at VIC1-1, 28?
No
Check the connection between VIC1-1 and power.
Yes
Does video signal of about 1 V appear at pins 7, 11, 15 of AV1 scart jack?
No
Check the connection between VIC1 and AV1 scart jack.
Yes
Check the RCA cable.


AV1 (RGB) Input Error
Does video signal of about 0.7 V appear at input jack?
No
Check the scart cable.
Yes
Do CN3-19, 21, 23 on Jack PCB have normal level?
No
Check the connection between CN3-19, 21, 23 and AV1 scart jack.
Yes
Check Main PCB.


AV4 CVBS Video Input Error
IC201-15 has nomal level? (Jack PCB)
No
Check the connection between IC201-15 and AV4 Line Input jack
Yes
IC201-13 has nomal level?
No
Check IC201-16 of input power
Yes
IC201-9, 10 is in low and high state respectively?
No
Check the connection between IC201-9, 10 and FIC1-36, 37
Yes
Change Main PCB


AV3 CVBS Video Input Error
IC201-14 has nomal level? (Jack PCB)
No
Check the connection between IC201-14 and AV3 Line input jack
Yes
IC201-3 has nomal level?
No
Check IC201-16 of input power
Yes
IC201-9, 10 is in low and high state respectively
No
Check the connection between IC201-9, 10 and FIC1-36, 37
Yes
Change Main PCB

4 Disassembly and Reassembly

4-1 Order of Disassembly

Refer to the Disassembly Flowchart in Fig. 4-1-1 for the order of removing components. When reassembling components, use the reverse order to removal unless otherwise specified.

Reading Disassembly Flowchart:

After locating the target component in the flowchart, remove all components of the target in sequence, following the arrows (routes) from the top of flowchart. If multiple routes exist to the target component from the top of flowchart, remove all the components on all the routes.

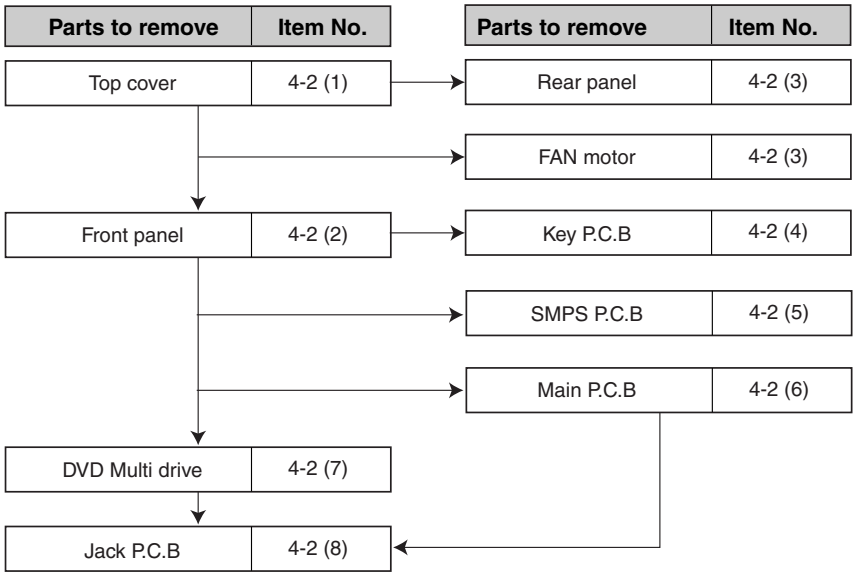


Fig. 4-1-1 Disassembly Flowchart

4-2 Disassembly

Information:
Numbers in figures are step numbers in disassembly procedure, and letters in brackets [ ] show the types of screw.

(1) Top Cover

1) Remove the 2 screws [A].
2) Remove the 3 screws [A].
3) Slightly open both ends on the rear side of top cover and lift the top cover in the direction of the arrow.

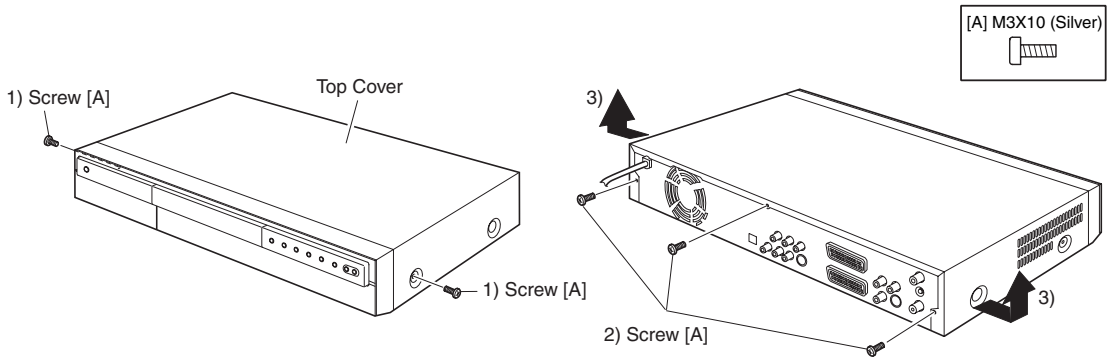


Fig. 4-2-1 Top cover

(2) Front Panel

1) Release 3 tabs (A) and 2 tabs (B) in this order. (The tab (A) and the tab (B) should be release at the same time, respectively.)
2) Slowly move the front panel forward to disconnct the connector with front panel.

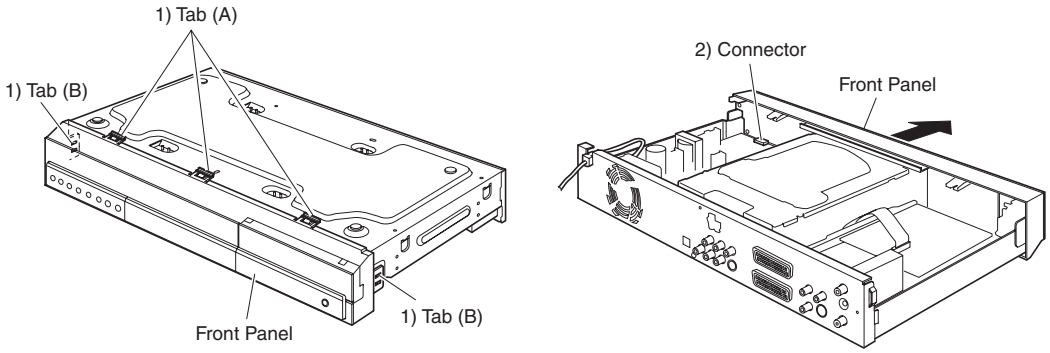


Fig. 4-2-2 Front Panel

(3) Rear Panel and FAN Motor

1) Remove the power cable.
2) Remove the 3 screws [F] and screw [G], screw [A].
3) Disconnect the fan motor connector.
4) Release the 2 tabs and remove the rear panel.

When disassembling only FAN motor:

a) Remove 2 screws [B].
b) Disconnect the fan motor connector [3) in the figure].

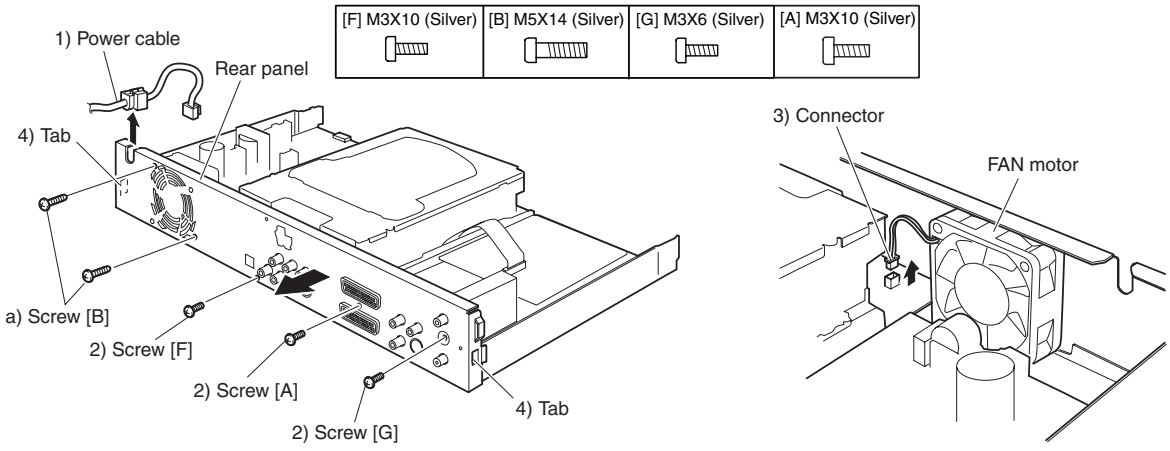


Fig. 4-2-3 Rear Panel and FAN Motor

(4) Key P.C.B

1) Remove the 2 screws [F] and remove the Front Angle.
2) Remove the 4 screws [F].
3) Release the tab at the center of P.C.B, and then remove the Key P.C.B.

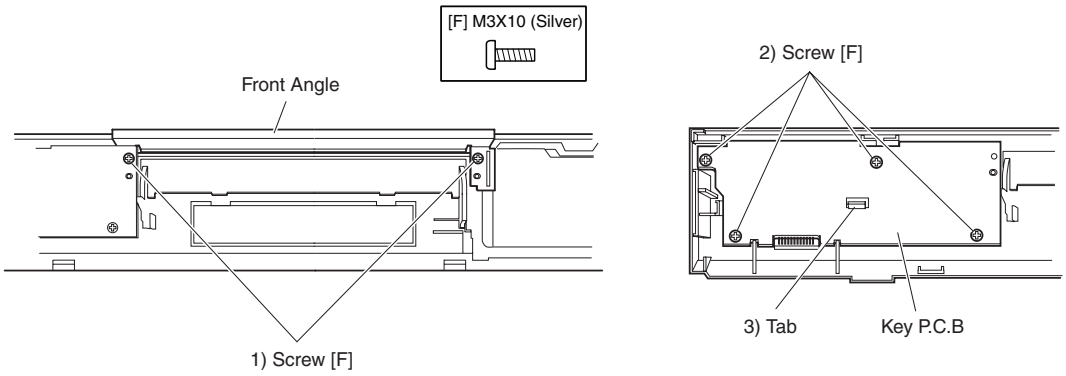


Fig. 4-2-4 Key P.C.B

(5) SMPS P.C.B

1) Disconnect the 2 connectors and 4P connector.
2) Remove the 4 screws [D].
3) With the tab on the right of frame released, lift the entire P.C.B.

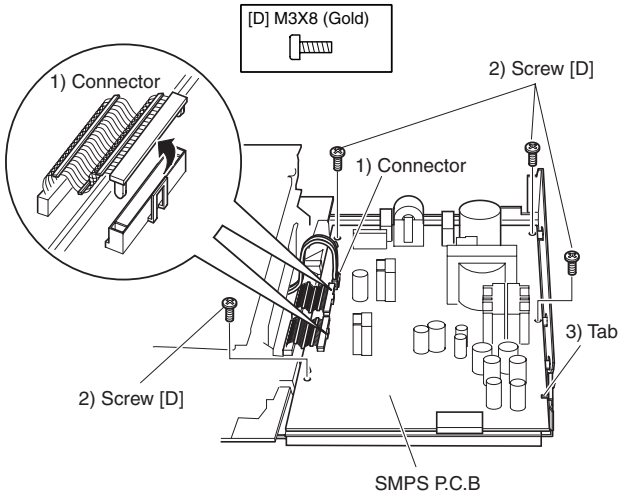


Fig. 4-2-5 SMPS P.C.B

(6) Main P.C.B

1) Disconnect the FFC. *FFC: Flexible flat cable
When reconnecting the FFC, insert them into the connector, following the instructions in illustration, and check the connection status.
2) Remove 2 screws [D].
3) While depressing the P.C.B securing tab using long-nose pliers, etc., lift the Main P.C.B out vertically.

Caution

The 3 direct connectors that connect the Main P.C.B and Jack P.C.B (at the back of Main P.C.B) are tightly locked: Carefully pull out the Main P.C.B.

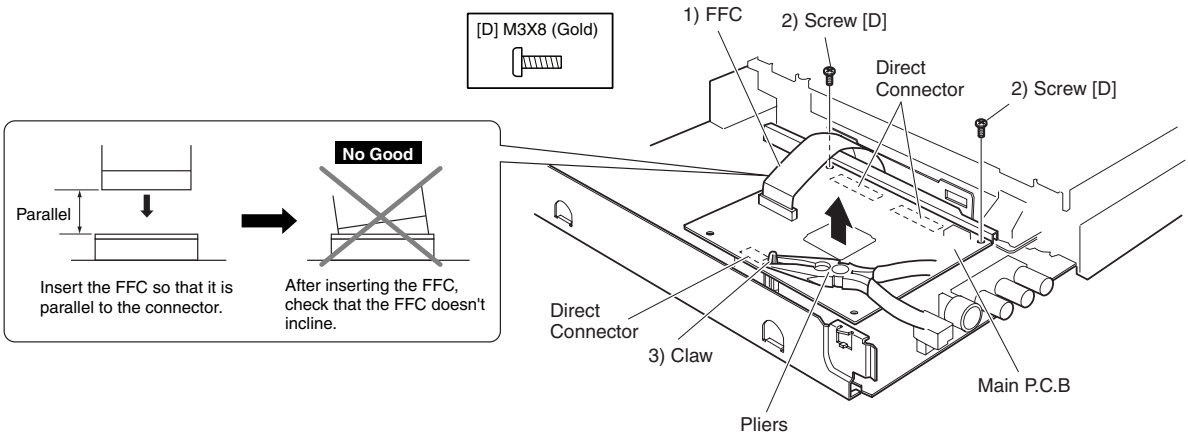


Fig. 4-2-6 Main P.C.B

(7) DVD Multi Drive

1) Disconnect the FFC.
When reconnecting the FFC, insert it into the connector, following the instructions in illustration, and check the connection status.
2) Disconnect the connector.
3) Remove 4 screws [E].
4) Pull the DVD multi drive out vertically.

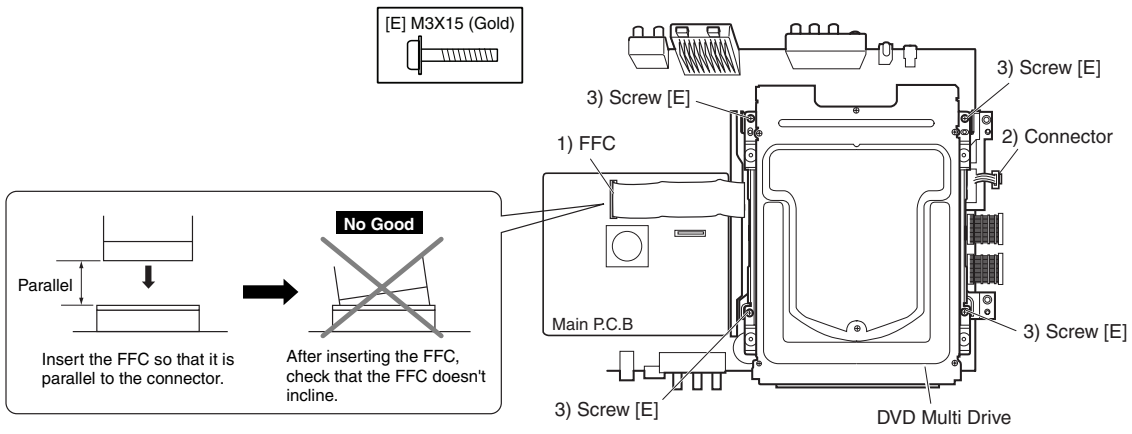


Fig. 4-2-7 DVD Multi Drive

(8) Jack P.C.B

1) Remove the rear panel. (See item(3).)
2) Disconnect 2 connectors.
3) Remove ther spacer and metal fitting
4) Remove the 2 screws [D].
5) Pull the Jack P.C.B out vertically.

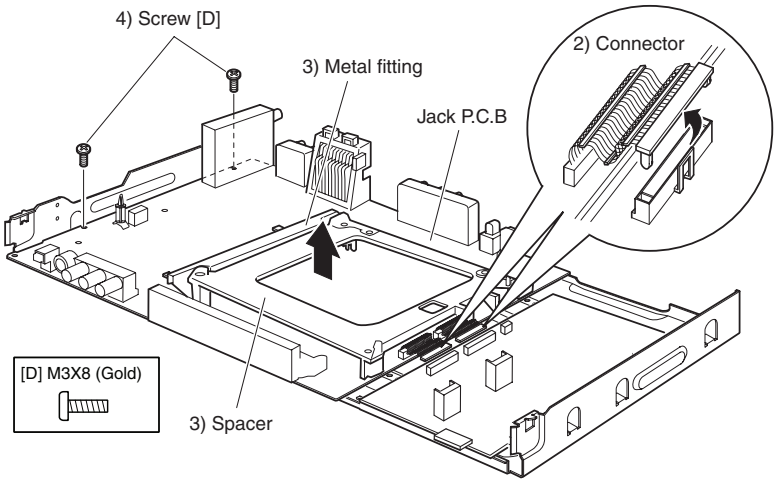
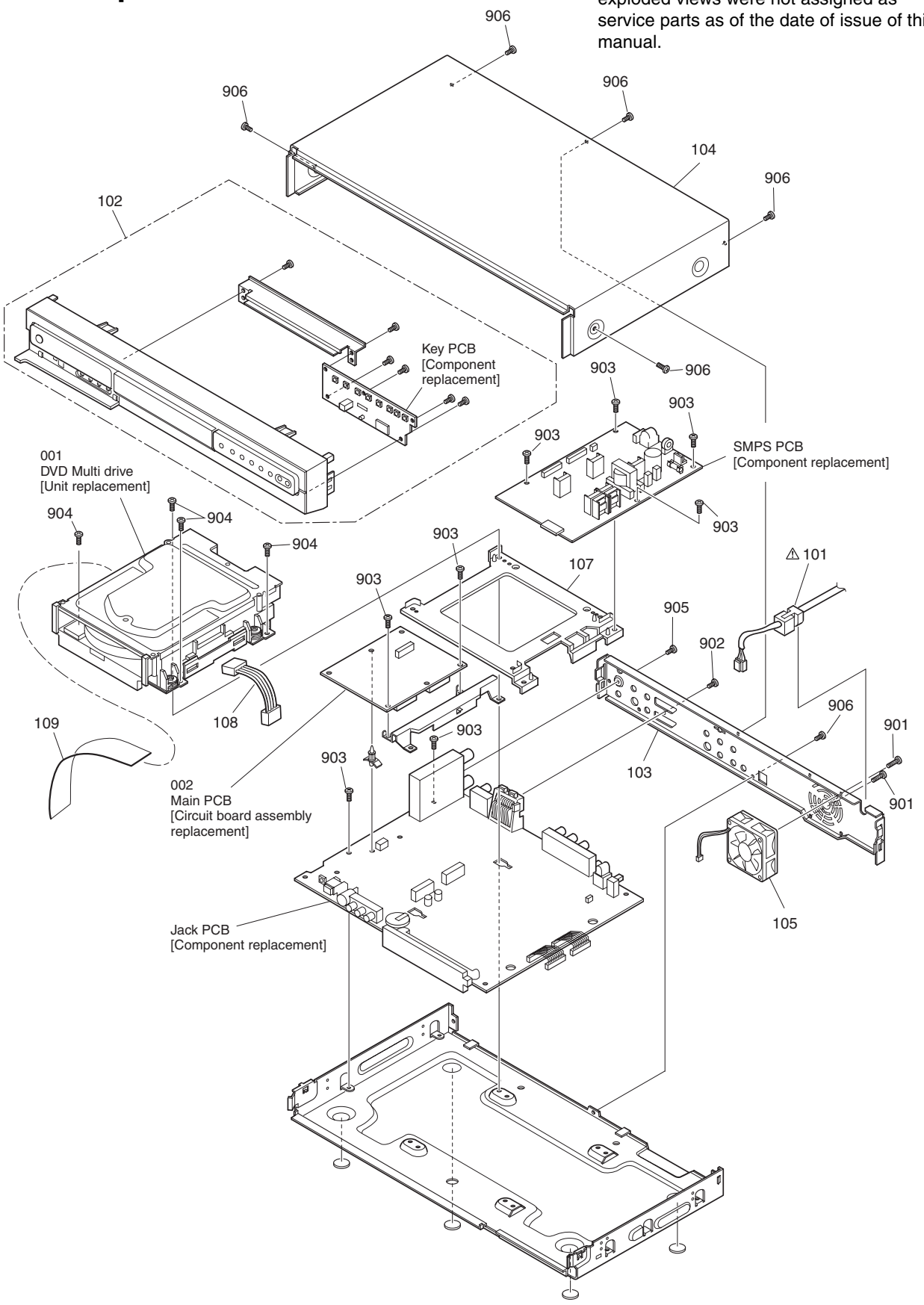


Fig. 4-2-8 Jack P.C.B

5 Exploded View and Parts List

5-1 Exploded View

Note: Components without any numbers in exploded views were not assigned as service parts as of the date of issue of this manual.



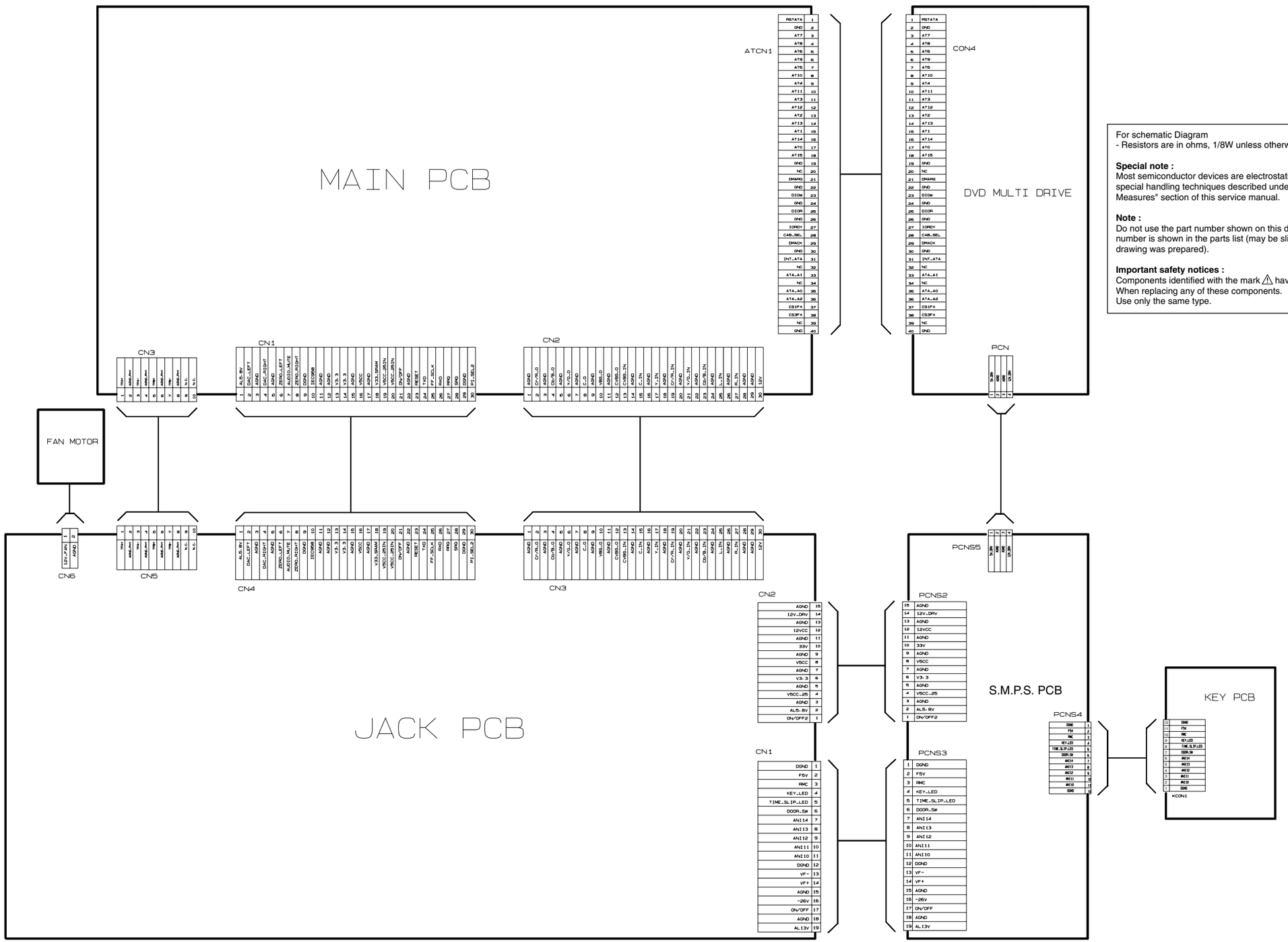
THE UPDATED PARTS LIST

FOR THIS MODEL IS

AVAILABLE ON ESTA

S SCHEMATIC, WIRING DIAGRAMS

S-1 Wiring



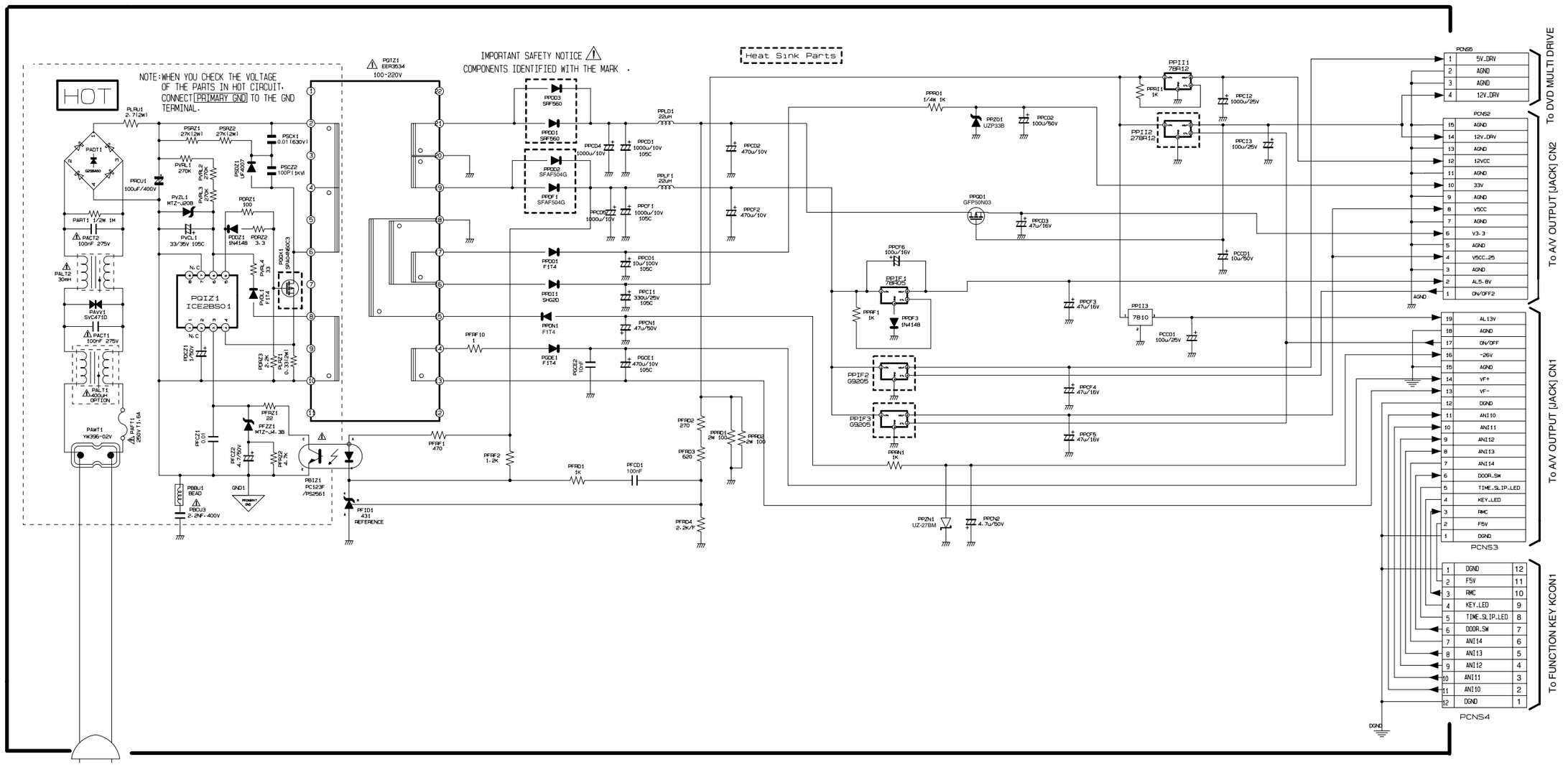
For schematic Diagram
- Resistors are in ohms, 1/8W unless otherwise noted.

Special note :
Most semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatic Protection Measures" section of this service manual.

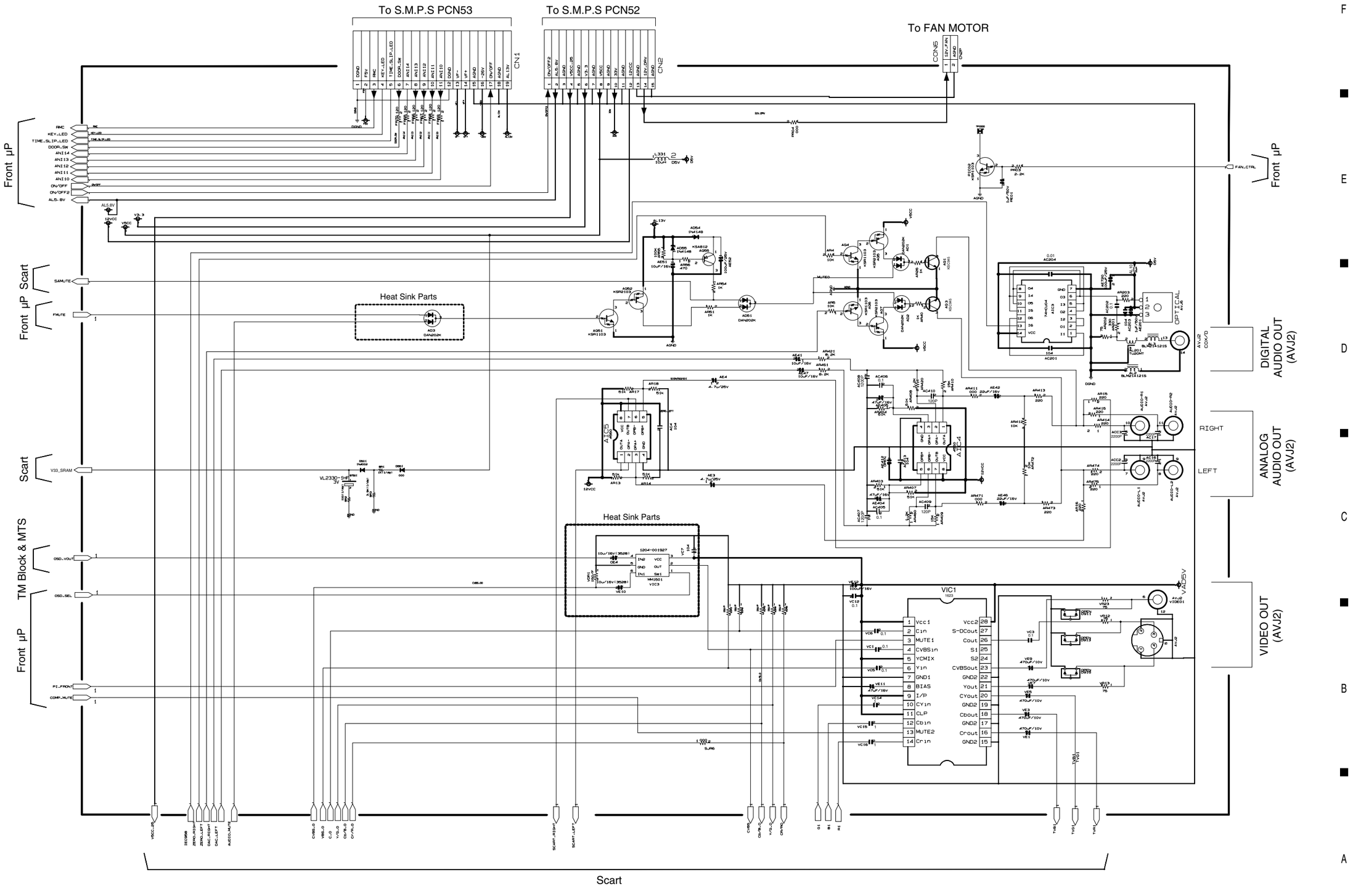
Note :
Do not use the part number shown on this drawing for ordering. The correct part number is shown in the parts list (may be slightly different or amended since this drawing was prepared).

Important safety notices :
Components identified with the mark ⚠ have the special characteristics for safety.
When replacing any of these components.
Use only the same type.

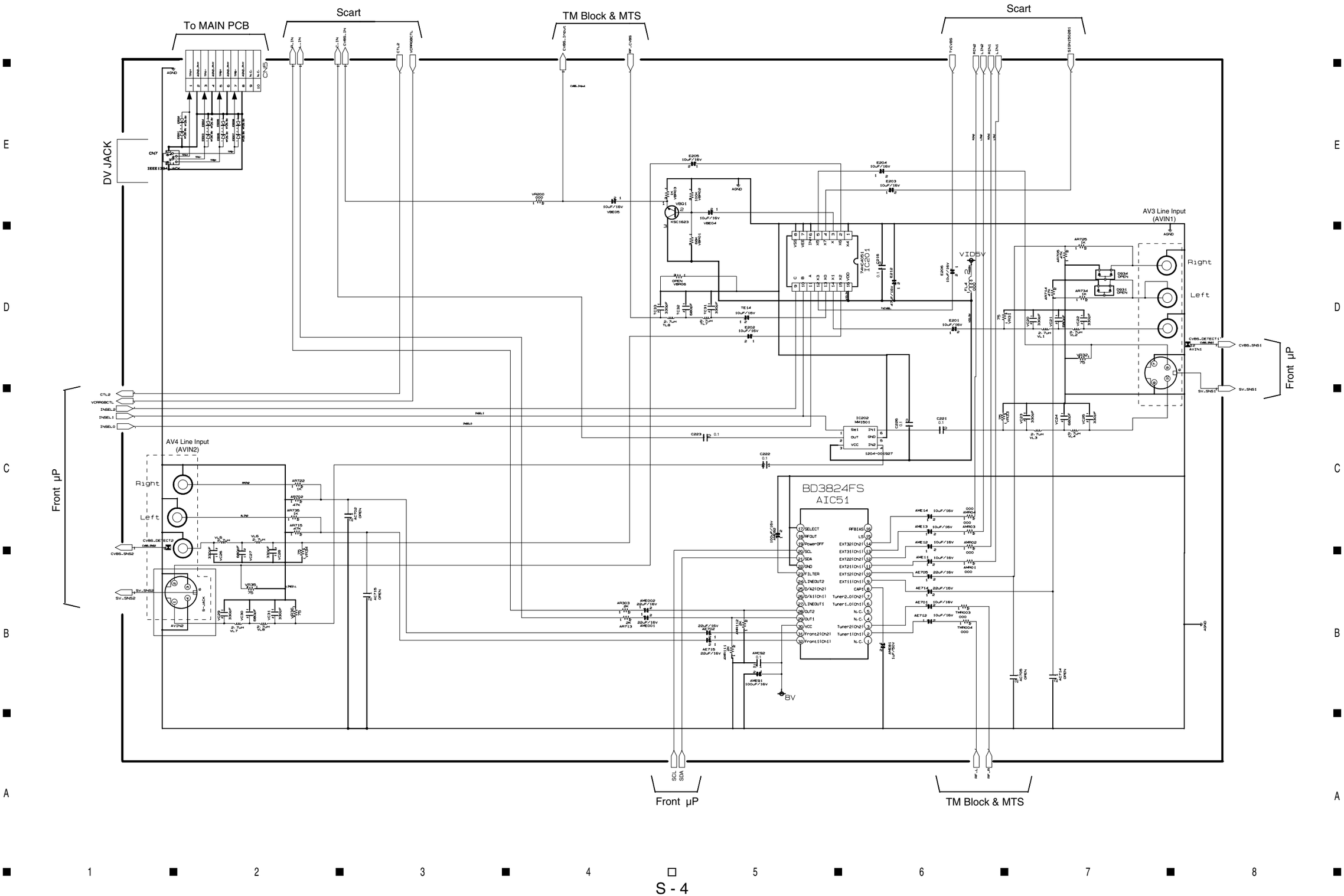
S-2 S.M.P.S.


HOT
NOTE:WHEN YOU CHECK THE VOLTAGE OF THE PARTS IN HOT CIRCUIT, CONNECT PRIMARY GND TO THE GND TERMINAL.
IMPORTANT SAFETY NOTICE
COMPONENTS IDENTIFIED WITH THE MARK .
Heat Sink Parts
PQTZ1 EER3534 100-220V
PADT1 GBU6A60
PRCU1 100uF/400V
PSRZ1 27K(2W)
PSRZ2 27K(2W)
PSCX1 0.01(630V)
PSCZ2 100PF(1KV)
PVRL1 270K
PVRL2 270K
PVRL3 270K
PVZL1 MTZ-J20B
PVCL1 33/35V 105C
PART1 1/2W 1M
PACT2 100nF 275V
PALT2 30mH
PQRZ1 100
PQDZ1 1N4148
PQRZ2 3.3
PQDE1 SPA04N60C3
PQRR4 33
PQDR1 FIT4
PQIZ1 ICE2BS01
PAVV1 SVC471D
PACT1 100nF 275V
PALT1 400uH OPTION
PQDZ1 UF4007
PQRZ3 2.2K
PQVV1 0.33(2W)
PAWT1 YK396-02V
PAUF1 250V T1.6A
PFRZ1 22
PFZZ1 MTZ-J4.3B
PFCZ1 0.01
PFRZ2 4.7/50V
PFVV1 4.7K
PBIZ1 PC123F /PS2561
PBBU1 BEAD
PBCU3 2.2NF-400V
GND1
PFID1 431 REFERENCE
PPDD3 SRF560
PPDD1 SRF560
PPDD2 SFAF504G
PPDF1 SFAF504G
PPLD1 22uH
PPLF1 22uH
PPCD4 1000u/10V
PPCD1 1000u/10V 105C
PPCD6 1000u/10V
PPCF1 1000u/10V 105C
PPCF2 470u/10V
PPDD1 FIT4
PPDD11 SHG2D
PPDN1 FIT4
PPCC1 10u/100V 105C
PPCI1 330u/25V 105C
PPCN1 47u/50V
PGDE1 FIT4
PGDE2 10R
PGCE1 470u/10V 105C
PFRF10 1
PFRF1 470
PFRF2 1.2K
PFRD1 1K
PFCD1 100nF
PFRD2 270
PFRD3 620
PFRD4 2.2K/F
PRRD1 2W 100
PRRD2 2W 100
PRRO1 1/4W 1K
PPZO1 UZP33B
PPCO2 100u/50V
PPDD1 GFPS0N03
PPCD3 47u/16V
PPCD1 10u/50V
PPCF6 100u/16V
PPIF1 78M05
PPRF1 1K
PPDF3 1N4148
PPIF2 GS205
PPIF3 GS205
PPRN1 1K
PPZN1 UZ-27BM
PPCN2 4.7u/50V
PPCF3 47u/16V
PPCF4 47u/16V
PPCF5 47u/16V
PPII3 78L10
PCCD1 100u/25V
PPII1 78R12
PPRI1 1K
PPII2 78R12
PPCI2 1000u/25V
PPCI3 100u/25V
PCNS5
5V_DRV
AGND
AGND
12V_DRV
PCNS2
AGND
12V_DRV
AGND
12VCC
AGND
33V
AGND
V5CC
V3.3
AGND
V5CC_25
AGND
AL5.8V
ON/OFF2
To A/V OUTPUT [JACK] CN2
To DVD MULTI DRIVE
AL13V
AGND
ON/OFF
-26V
AGND
VF+
VF-
DGND
ANI10
ANI11
ANI12
ANI13
ANI14
DOOR_SW
TIME_SLIP_LED
KEY_LED
RMC
F5V
DGND
PCNS3
To A/V OUTPUT [JACK] CN1
DGND
F5V
RMC
KEY_LED
TIME_SLIP_LED
DOOR_SW
ANI14
ANI13
ANI12
ANI11
ANI10
DGND
PCNS4
To FUNCTION KEY KCON1
DGND

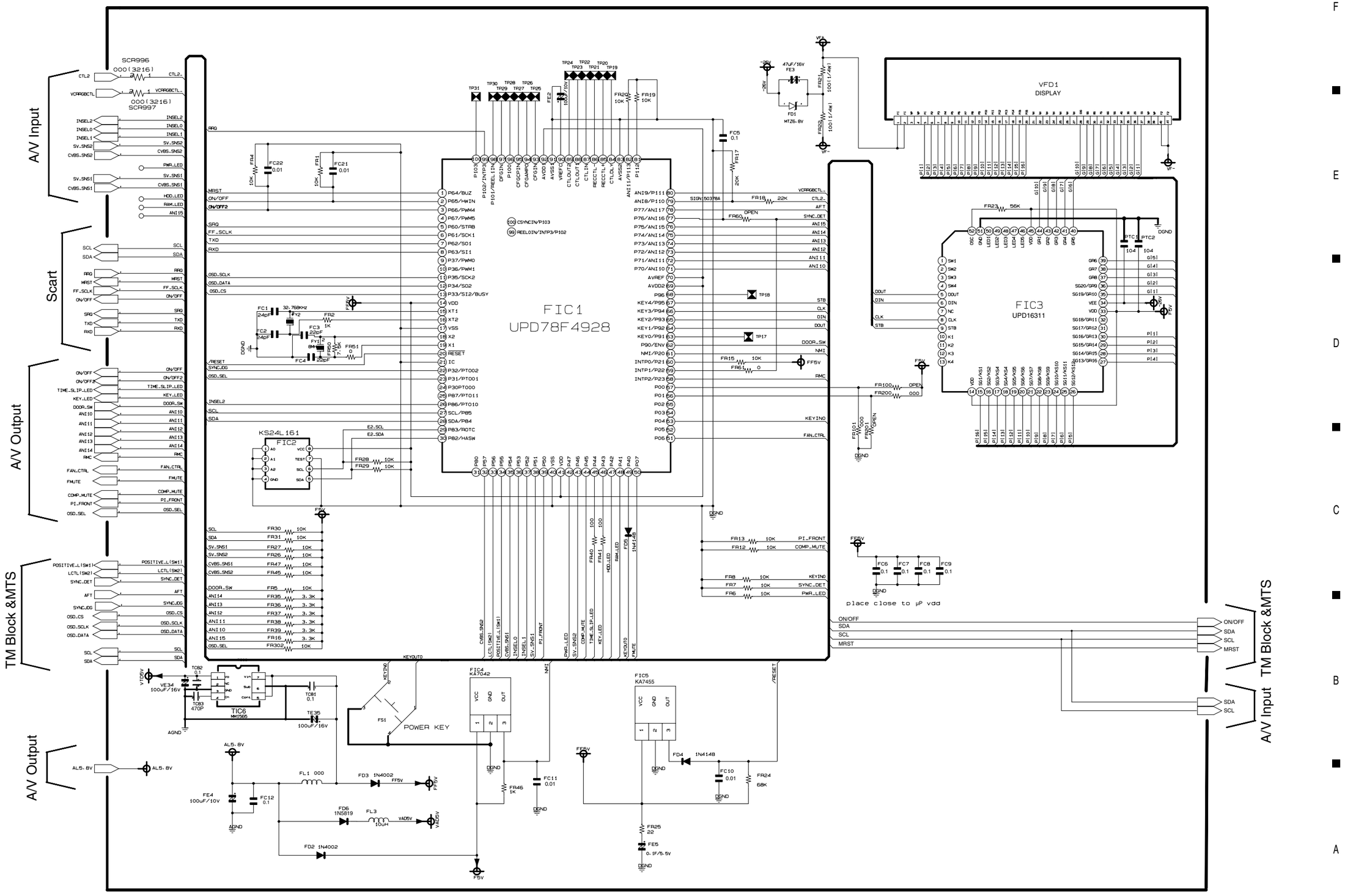
S-3 A/V Output [Jack]



S-4 A/V Input [Jack]

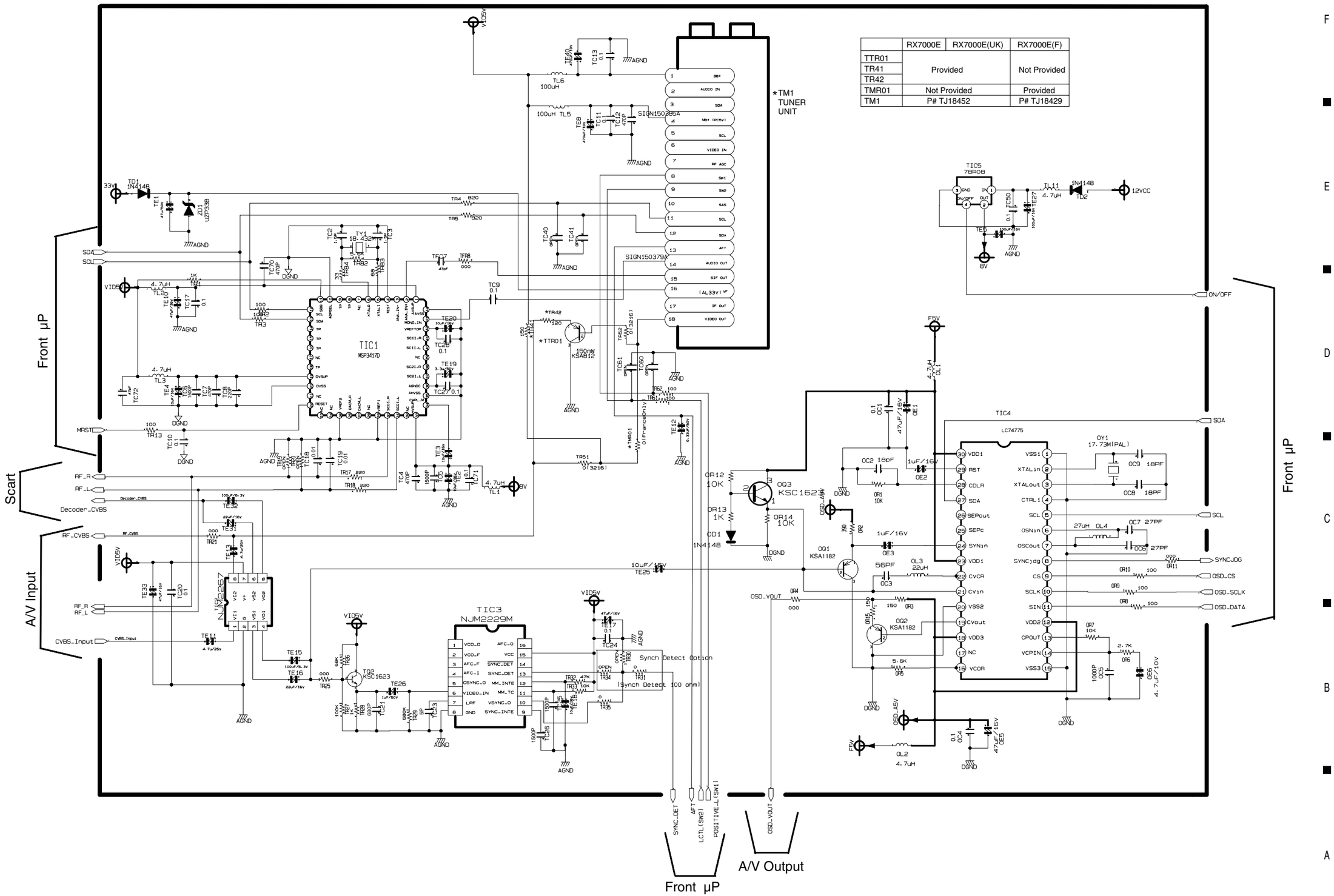


S-5 Front µP [Jack]

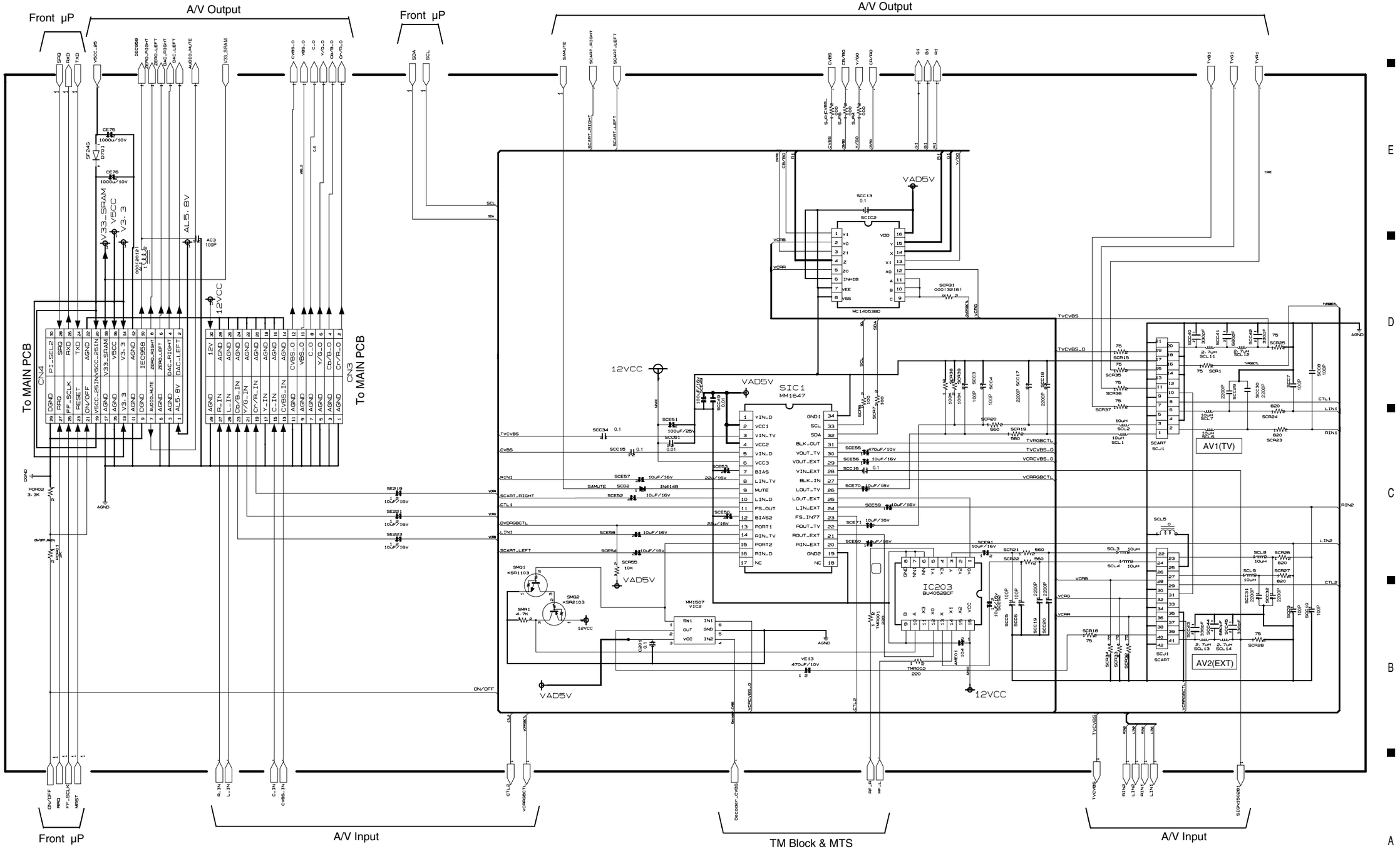


S-6 TM Block & MTS [Jack]

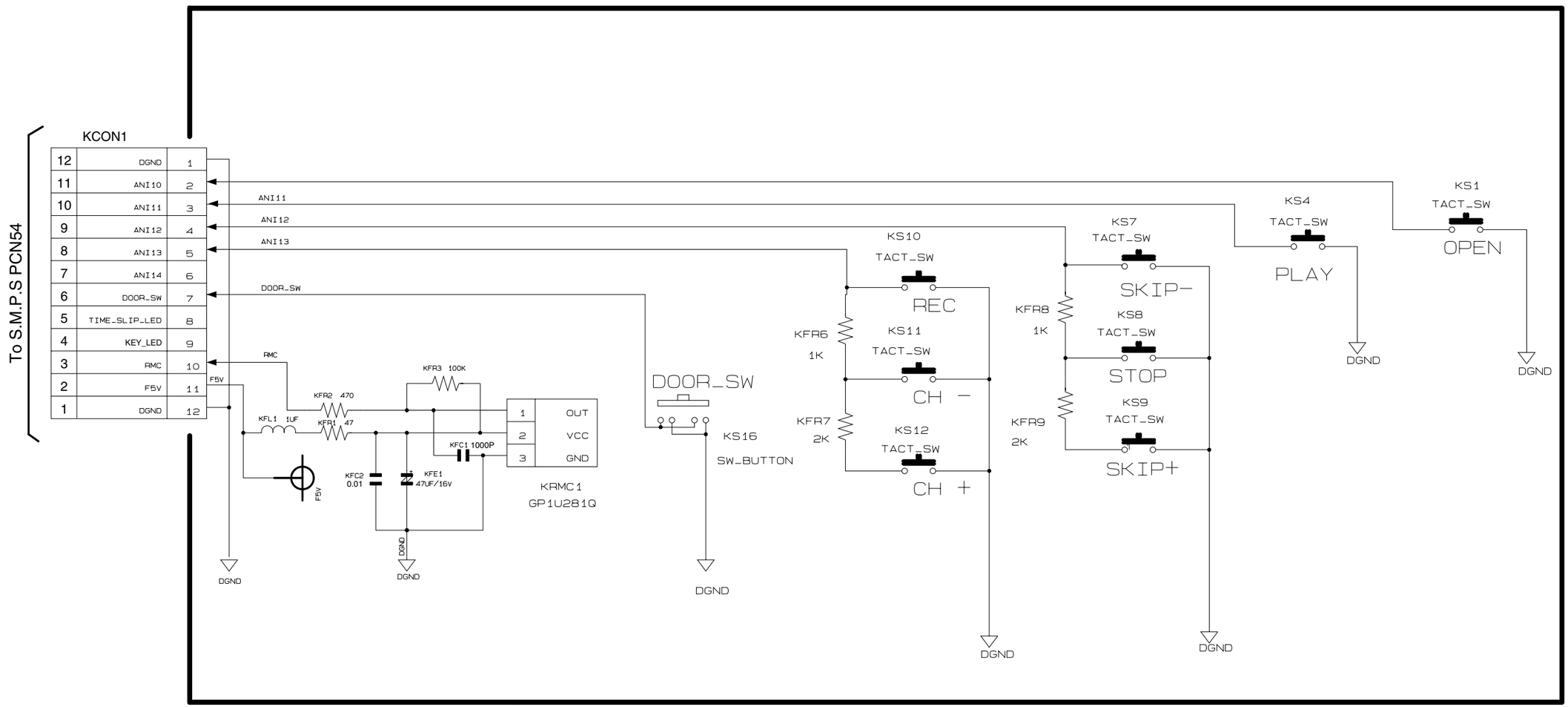
	RX7000E	RX7000E(UK)	RX7000E(F)
TTR01	Provided		Not Provided
TR41			
TR42			
TMR01	Not Provided		Provided
TM1	P# TJ18452		P# TJ18429



S-7 Scart [Jack]

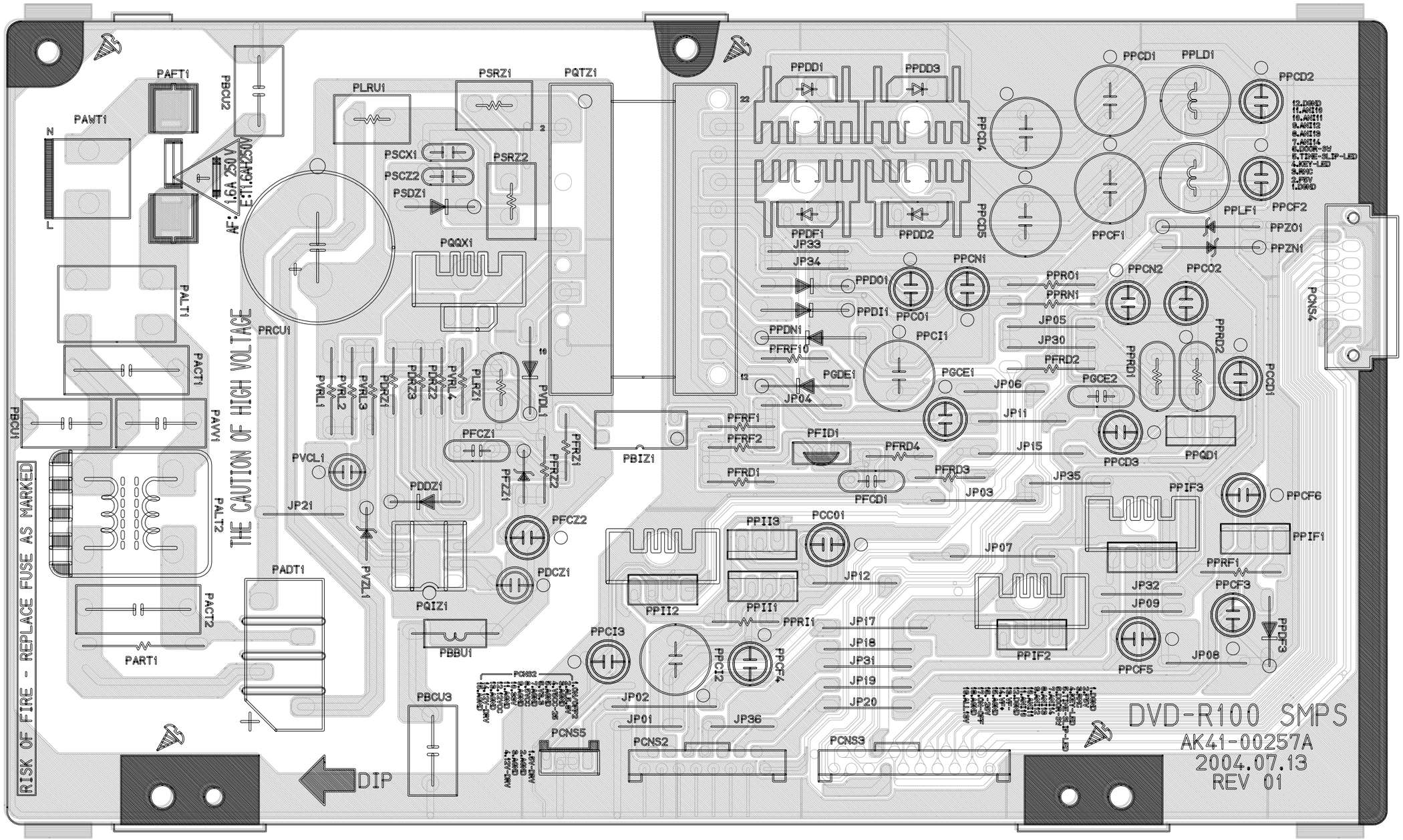


S-8 Function Key [Key]

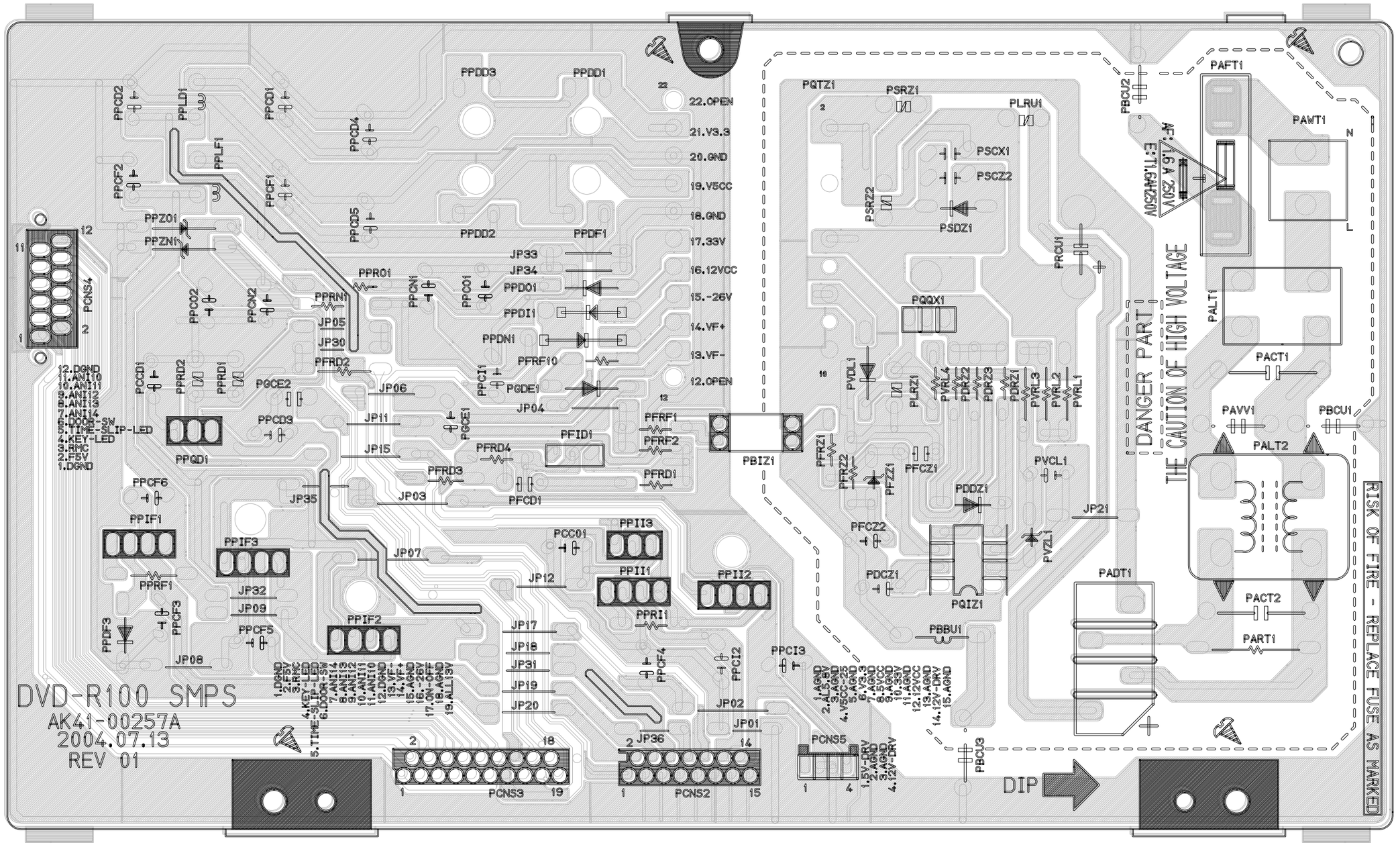


C CIRCUIT BOARD DIAGRAMS
C-1 S.M.P.S. PCB

COMPONENT SIDE



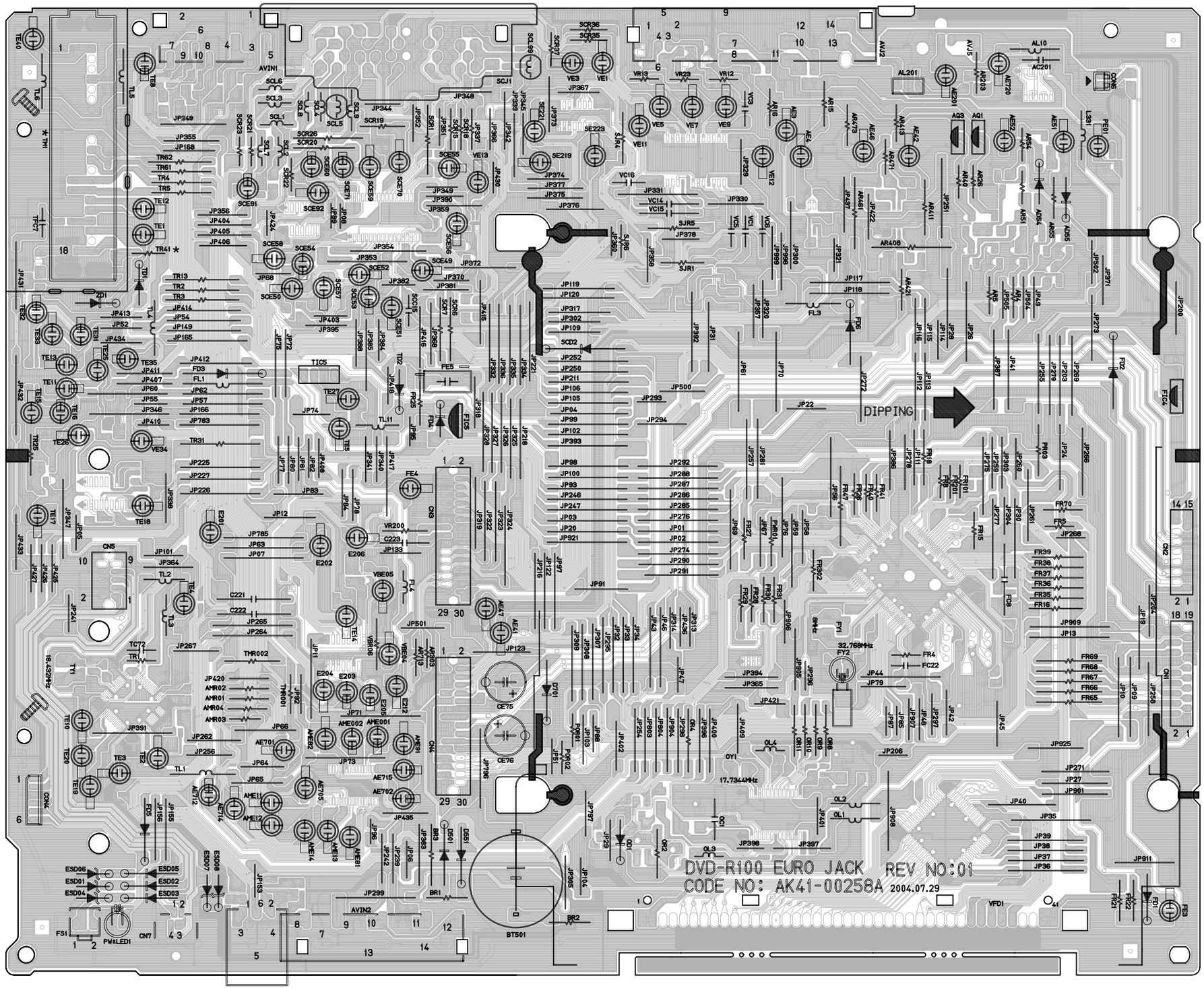
CONDUCTOR SIDE



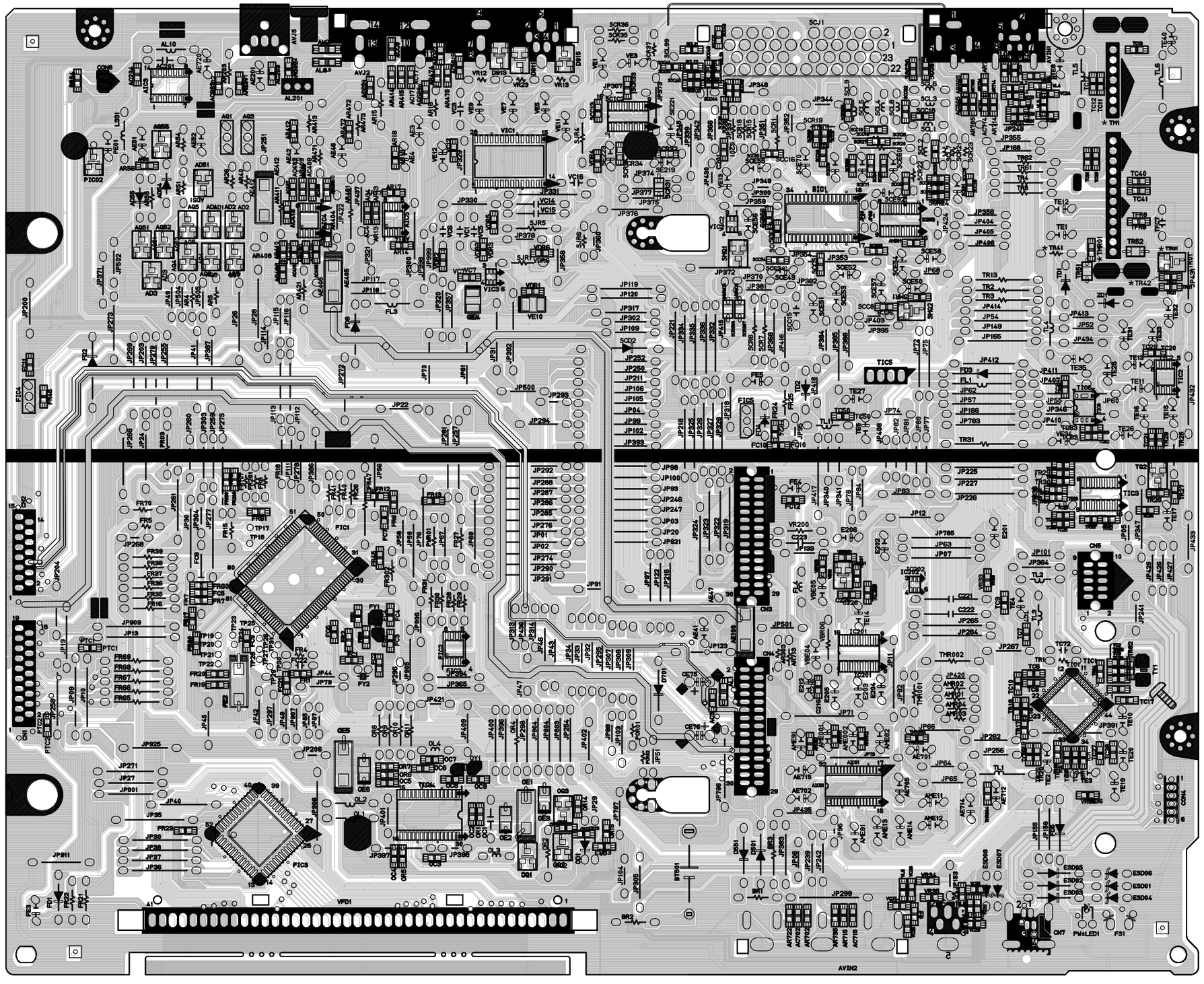
C-2 Jack PCB

	RX7000E	RX7000E(UK)	RX7000E(F)
TR41	Not Provided		Provided
TM1	P# TJ18452		P# TJ18429

COMPONENT SIDE



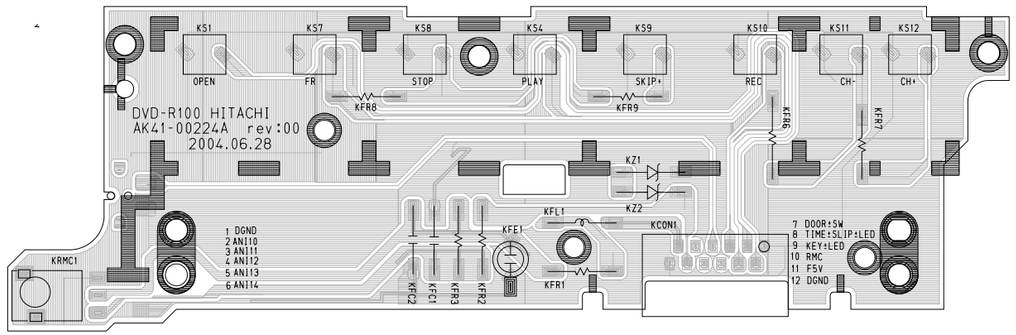
CONDUCTOR SIDE



	RX7000E	RX7000E(UK)	RX7000E(F)
TTR01	Provided		Not Provided
TR41			
TR42			
TMR01	Not Provided		Provided
TM1	P# TJ18452		P# TJ18429

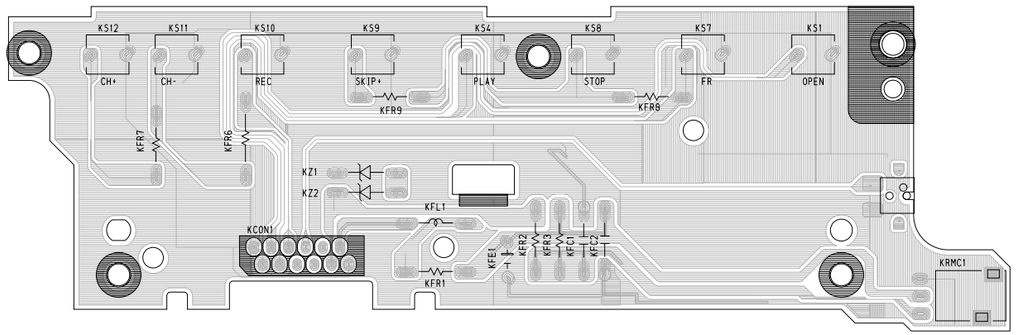
C-3 Key PCB

COMPONENT SIDE

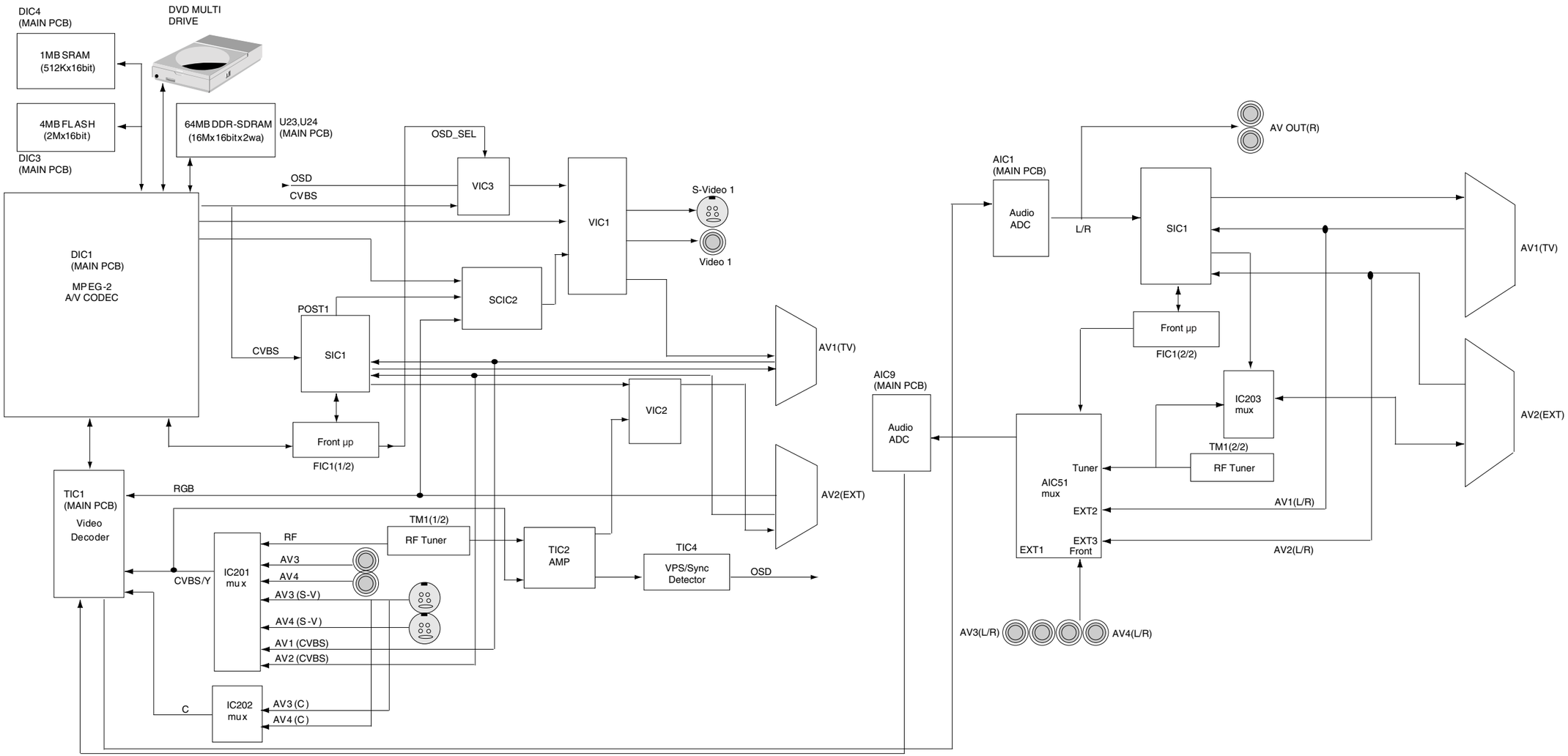


DVD-R100 HITACHI
AK41-00224A rev:00
2004.06.28

CONDUCTOR SIDE



B BLOCK DAIGRAM



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